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13. ABSTRACT *(Maximum 200 Words)*
Vegetation data were collected to identify and characterize disturbed alder (*Alnus* spp.) areas and provide an ArcView GIS layer for specific sites of alder encroachment likely due to human disturbance. Fifty-six plots were established and characterized from sites within previously mapped and delineated polygons on the EAFB vegetation map. Vegetation and physical site characteristics were described at each sample point. Physical site characteristics (e.g., moisture) were summarized and natural vs human-induced successional changes at each alder site were described. All sample plot locations and moisture and disturbance regimes were entered to an ArcView GIS. Alder plot data were investigated to ascertain a means of differentiating disturbed vs undisturbed alder sites in the field using floristic criteria. A multivariate data analysis program (SYN-TAX) was applied using ordination, k-means clustering and range of rows clustering. A stepwise procedure of successive approximations within SYN-TAX was used to further analyze or refine groupings of plots and species representative as they related to disturbed and undisturbed alder sites. The analysis suggested an inability to identify "disturbed" vs "undisturbed" alder sites based on their floristic composition. A more qualitative assessment of field work was presented, offering observations to assist Base land managers in their alder management decisions. An ArcView GIS Project was created containing the following theme layers: 1999 edited vegetation map of EAFB; alder plot locations; alder base map; wet alder; alder likely caused by human disturbance; and alder not likely caused by human disturbance. Metadata layers were provided for each of the latter five themes. The design of the GIS layers provides for a variety of queries to be made from each theme as well as using the themes in combination to assess site comparisons. These could prove useful for future separation of plots for management purposes. The database was designed such that additional alder plot data could be added in the future by linking data tables to the plot ID labels.

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IDENTIFICATION
and
CHARACTERIZATION of DISTURBED ALDER SITES
on
ELMENDORF AIR FORCE BASE, ALASKA

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ADDENDUM

Geographical Location Naming Conventions

All geographical naming conventions follow those used on the latest USGS 1:25,000-scale topography map selected as a basemap for the project's ArcView GIS component. It should be noted that a new system for naming streets was instituted on EAFB since this study was initiated, documented and all electronic records prepared. As a consequence, the following name changes are provided here for future cross-reference:

Burns Road	now	Airlifter Drive
Davis Road	now	Talley Avenue
Ridge Road	now	37th Street
Loop Road (running east and west north of Six Mile Lake)	now	46th Street
Loop Road (running north and south west of Lower Six Mile Lake)	now	Fairchild Avenue
Spring Lake and Antenna Field Road	now	42nd Street
Top of Hill Chalet Road	now	44th Street

Reference to these street changes are noted here; however, they have not been changed in the body of this report; the original field data; the hard and electronic archives; or the ArcView GIS.

INTRODUCTION

In January 1999, the Alaska Natural Heritage Program (AKNHP) undertook a project to establish and characterize long-term multidisciplinary monitoring plots on Elmendorf Air Force Base (EAFB), Alaska (Tande et al. 2001). The purpose of the project was to develop a method for monitoring long-term vegetation change and provide a baseline description of monitoring sites that Base personnel would use to periodically update the EAFB Integrated Natural Resource Management Plan (INRMP).

In conjunction with this project, supplemental vegetation data were collected to identify and characterize disturbed alder (*Alnus* spp.) areas and provide an ArcView GIS layer for specific sites of alder encroachment likely due to human disturbance. Alder is generally thought to be a pioneer species on disturbed sites which once established, aggressively occupy a site, and perhaps slow or prevent development to prior or more preferred habitat. It was anticipated that the results of this study might be used to assist Base Conservation and Environmental Planning personnel in the further identification of EAFB alder areas warranting consideration of restoration to prior conditions.

Objectives were to:

1. Collect alder plot data to investigate a means of differentiating disturbed and undisturbed alder types in the field using floristic composition;

2. Ground-truth the Type 20/21 Alder Tall Scrub as delineated on the EAFB vegetation map (Tande 1983) indicating disturbed alder sites and map polygons;

3. Create an ArcView Geographic Information System (GIS) with data layers depicting alder distribution, disturbed alder plots and polygons, and locations of wet alder sites and map polygons.

LOCATION

Elmendorf Air Force Base (EAFB) is situated on approximately 5314 hectares (13,130 acres) in Southcentral Alaska at the head of Cook Inlet. Alder plots were limited to the 3614 hectares (8,931 acres) of undeveloped land and 587 hectares (1,450 acres) of semi-developed land.

The Base is bounded by the Municipality of Anchorage to the south, the Knik Arm of Cook Inlet to the north and west, and Fort Richardson Army Base to the east. Elmendorf is located at 149 degrees, 48 minutes west longitude and 61 degrees, 15 minutes north latitude.

METHODS

Field Data Collection

Plot data were collected from alder sites within previously mapped and delineated polygons on the EAFB vegetation map (Tande 1983). Site selection was based on stratified random sampling methods (Mueller-Dombois and Ellenberg 1974, Steel and Torrie 1960) and involved: (1) the broad stratification of EAFB using the existing 1983 alder vegetation map classes (Tande 1983), surficial geology (Miller and Dobrovolny 1959) and soils maps (Wikgren and Moore 1997); (2) randomly locating sampling points within these strata; and (3) sampling major alder communities found near the sampling point.

Vegetation map delineations (Tande 1983) were further refined using the most recent infrared aerial photos (1995, scale 1:12,000). Cover types (map units) and airphoto signatures were prioritized to

insure that a maximum number of different areas were visited across moisture, elevation and physical gradients within the alder vegetation class.

Vegetation and physical site characteristics were described at each sample point within a homogeneous alder unit. Rapid survey techniques were employed to maximize data collection due to time and budget constraints; all vegetation descriptions were made using the sampling plots (relevé) techniques of Mueller-Dombois and Ellenberg (1974). This approach had an added advantage in that it is a similar methodology to that employed in the original 1983 inventory, thus allowing more direct comparisons between datasets as well as an opportunity for the integration of datasets in future investigations.

Sampling plots were nested as follows: trees - 500 m^2, shrubs - 50 m^2, herbaceous understory - 5 m^2, and mosses and lichens - 0.5 m^2. Within linear sites too narrow to enclose a plot, it was necessary to use correspondingly narrow plots; in these cases, the total plot area was maintained.

In areas with homogenous vegetation that appeared to be representative of the map class and photo signature, visual estimates of dominant growth forms and percentage cover for all dominant plants were made, associated species noted, and physical site characteristics described.

Ocular estimates were used to estimate canopy cover for each species and was defined as the percentage of the ground in the plot covered by the gross outline of an individual plant's foliage (canopy), or the outline collectively covered by all individuals of a species or life form within the plot (Brown 1954, Daubenmire 1959). Summing of the cover values within each structural layer using these techniques may total greater than 100 percent indicating that the vegetation is layered and overlapping. Canopy cover classes used for estimation were as follows:

Tree (> 8 m)
Tall Shrub/dwarf tree (1.5 - < 3 m)
Low Shrub (0.5- < 1.5 m)
Dwarf Shrub (< 0.2 m)
Graminoids
Forb
Ferns/Fern Allies
Moss
Lichen

Scientific nomenclature follows Hultén (1968) and Viereck and Little (1972). Plant specimens not identified in the field were collected and identifications were completed in the laboratory by the AKNHP Chief Botanist.

Physical site characteristics included descriptions or scale values for: terrain (slope, aspect, elevation); physiographic features; surficial geological features; subjective site and soil moisture at 10 cm depth; flooding condition; plant community distribution pattern; and successional comments. An effort was made onsite to determine whether the site originated from human disturbance activities, noting such things as aerial photo patterns, soils, bulldozer blading and berming, military training activities, and other human-related changes to the site.

The site record also included plot number, date, observer, general location, airphoto number, and location information. Example data sheets were stored in the LTVMP Hard Archive Record (Tande et al. 2001) on file at the Conservation and Environmental Planning Office, EAFB.

Laboratory Techniques

Analysis of Disturbed vs Undisturbed Alder

Vascular plant identifications and verifications from the field data were completed and added to a species list prepared for the study area during the long-term monitoring study (Appendix 1).

Site moisture was summarized for all plots and major map polygons and described as Dry, Moist, Wet, or Aquatic (Raup 1969). These terms were derived from prompts used in the field to rapidly and consistently assess site/soil moisture at the end of the growing season. Saturated and seasonally/permanently flooded sites were entered to the ArcView GIS alder plot layer (Theme).

Physical site characteristics and notes were used to summarize what was known and/or could be ascertained in the field about the origin of each visited plot. Features which might likely affect natural versus human-induced successional changes on the alder site/community were also noted. All sample plot locations were entered to the ArcView GIS. Those plots determined to have originated from human disturbance activities were denoted as "Disturbed" while all others were noted as "Natural" or of "Unknown" origin. All determinations were entered to the ArcView GIS plot record.

Alder plot data were investigated to ascertain a means of differentiating disturbed vs undisturbed alder sites in the field using floristic criteria. If a species or a particular combination of species could be linked to disturbed sites, a dichotomous key would be developed for field identification of such sites for future alder site reclamation work.

Alder analysis consisted of creating a matrix of plots and species cover values in a Microsoft Excel© spreadsheet and importing the dataset to SYN-TAX, a computer multivariate data analysis program for ecology and systematics used to group plots based on species and species cover values (Podani 1993, 1995/98). Analysis was run using ordination, k-means clustering and range of rows clustering. The latter two analyses use equations that are a variation on the sum of squares to determine the mathematical distance between two objects (plots). A stepwise procedure of successive approximations within SYN-TAX was used to further analyze or refine groupings of plots, and species representative, and thus indicative, of disturbed and undisturbed alder sites. These iterations of SYN-TAX and subsequent results and interpretations are presented in the Results section.

ArcView GIS Development

The preparation of data layers for the alder GIS application involved a variety of construction tasks. A base map was prepared for the alder project using the vegetation map prepared by Tande (1983) and automated by Colorado State University, Fort Collins-Center for the Ecological Management of Military Lands (CEMML). Additional edits of polygon line work and expansion of attributes were performed on the 1983 vegetation layer prior to its use as a base map.

Appendix 2 is an outline description of the alder GIS: The edited version of the 1983 vegetation map is labeled in the GIS as VEG83.SHP. To this edited coverage was added an attribute labeled ALDER. An "A" was added in this field for each polygon that had a primary alder community type. These included two alder classes (Tande 1983): Type 20 for Closed Alder Tall Shrub and Type 21 for Open Alder Tall Scrub (Upland Forest Regeneration). To this layer were added polygons determined from the field survey to now be an alder vegetation community. These included areas that had grown up over the past 18 years to alder and those that were mislabeled in the electronic depiction of the original vegetation map. These polygons were also labeled "A". The Alder attribute was then used to extract all polygons containing alder community types as its primary vegetation cover. This layer became the project's alder base map (99ALDER.SHP).

The alder base map (99ALDER.SHP) was used to help select alder field sites to sample uniformly across alder polygons as well as provide the coverage to which the alder field plots were automated. Alder plots were thus located and a Point Feature Coverage was generated, (ALDERPLOTS.SHP). Using the field plot notes and observations, a moisture and disturbance call were made for each plot and the plot identification codes were added.

A moisture and disturbance determination were also made for each alder polygon on the alder base map. Three moisture classes, dry (D), moist (M), and wet (W), were distinguished (Raup 1969). Disturbance was divided among three classes: "D", representing those polygons in which alder encroachment was likely due to human disturbance; "N", those alder sites not likely caused by human disturbance; and "UNK", with unknown origins. Polygons were not labeled in the disturbance field if data was unavailable. Additional lines were added and polygons were split to assure moisture and disturbance distinctions.

Wet polygons were extracted and a WETALDER.SHP shape file was created. This represents those sites with excess moisture and standing water present much of the year. Two additional queries performed on the alder base layer produced files for those areas where alder encroachment was likely due to human disturbance (DISTURBALDER.SHP), and those areas where the presence of alder was not likely caused by human disturbance (UNDISTURBALDER.SHP).

Hard copy map examples were produced (Appendix 3) showing the following: 1) alder plot locations over the 1983 vegetation map; 2) wet alder areas, or sites with excess moisture and standing water present throughout much of the year; 3) alder areas where disturbance was likely caused by human disturbance; and 4) alder areas not likely caused by human disturbance.

Metadata layers were produced using the ARCVIEW metadata module present in ARCVIEW 3.2. These were generated for five layers: 1) the alder base map; 2) wet alder; 3) disturbed alder; 4) undisturbed alder; and 5) the alder plot location layer. These metadata reports are summarized in Appendix 4, and the digital files are labeled respectively as 99ALDER.met, WETALDER.met, DISTURBALDER.met, UNDISTURBALDER.met, and ALDERPLOTS.met on the project CD.

The hard-copy and digitized products containing the locations of permanent plots and all other digital map data generated as a result of the project were developed and in a format compatible with the EAFB ArcView GIS system.

RESULTS

Alder vegetation map delineations (Tande 1983) were further refined using the 1995 infrared airphotos and ground-truthed annotations were made to a field map. The most significant changes were noted for Type 20 along Cook Inlet coastal bluffs where alder was actually forested bluff. The photography used in 1983 was flown in late season where long shadows at the time were interpreted as a narrow alder zone along the coast. Earlier-season 1995 photos allowed for reinterpretation and correction of this condition. Major changes were entered to the ArcView GIS alder layer.

Numerous additional site visits were made to establish the origin of an alder site. Those 1999-2000 field interpretations not incorporated into the final GIS product are available in the field data books and on a field copy of the 1983 vegetation map on file at EAFB Conservation and Environmental Planning Office. A significant portion of the alder cover around the antenna field complex southwest of Lower Six Mile Lake was not thoroughly ground-truthed as it was off-limits and roads were gated. Consequently, the whole of this area should not be classified as all "wet alder swamp" or as "disturbed" as may be indicated in the final GIS. It was not possible to incorporate all 1983 modifications due to technicalities of the ArcView GIS software and to the short duration and limited funding of the alder project.

Fifty-six alder vegetation plots were established and characterized between July 15 and August 15, 1999, and June 15 and August 15, 2000. The following individuals participated in the field seasons:

Gerald (Jerry) Tande	(JT, TA)	Principal Investigator/Vegetation Ecologist
Susan Klein	(SK)	Field Assistant/Plant Ecologist
Julie Michaelson	(JM, MALD)	Field Ecologist/GIS Specialist

Abbreviations are provided for any future reference to notations in the field data.

All plot locations were recorded on mylar airphoto overlays and pin pricked on the 1995 airphotos used throughout this and the long-term monitoring project (Tande et al. 2001). These products and copies of all field data and subsequent analyses are stored in the Hard Archive System described in the long-term monitoring report. An ArcView GIS map of all alder plot locations was prepared as one objective of this project and is described below.

Site moisture was summarized for all plots and major map polygons (Table 1). Saturated and seasonally/permanently flooded (Wet) sites were entered to the ArcView GIS alder plot layer (View) described later in this report.

Physical site characteristics and notes were summarized on the origin of alder sample plots. Human disturbance activities were denoted as "Disturbed"; those sites determined to be unrelated to such activities were labelled "Undisturbed" and in some cases, "Unknown" (Table 1). These plot features were also entered to the ArcView GIS plot record.

Plot numbers and their respective disturbance regimes are/were used to cross-reference to the various SYN-TAX outputs discussed below.

Analysis of Disturbed vs Undisturbed Alder

The stepwise analysis procedure of successive approximations using SYN-TAX (Podani 1993), and subsequent results and interpretations are summarized in Table 2. Output from these analyses are found in an Appended Packet and may be cross-referenced to Table 2 and the discussion below by alphanumeric code. The short duration of this project and its limited funding precluded the professional graphic production of any of these files generated from the SYN-TAX program.

Alder plots were analyzed using the statistical package SYN-TAX (Podani 1993, 1995/98) using k-means clustering and range of rows clustering. Both use equations that are a variation on the sum of squares to determine the mathematical distance between two objects (plots).

Ordination was first used to determine how many clusters to use during a non-hierarchical analysis (Table 2: I). A biplot and bar graph were examined for breaks or diversions from the center to select the number of clusters. The biplot and bar graph indicated that three clusters should be selected for non-hierarchical analysis. K-means clustering was run on the data matrix to elicit the three clusters. These clusters were found to divide along alder species lines. Thus one cluster consisted of American green alder (*Alnus crispa*), one of Sitka alder (*Alnus crispa* var. *sinuata*) and one of thinleaf alder (*Alnus tenuifolia*). When disturbed and undisturbed associations were enumerated, there appeared to be no difference between disturbed and undisturbed sites. The result was the same when the analysis was run again using the range of rows algorithm.

Since a number of species had cover of less than 5 percent, it was decided to remove these from the analysis to see if that would influence the analysis (Table 2: II). A new data matrix was created in which species with less than 5 percent cover were omitted. Ordination was run and the bar graph indicated two clusters should be used. Non-hierarchical analysis using k-means clustering was run with two clusters specified. One cluster consisted of plots in which Sitka alder was the dominant

Table 1. Summary of alder plot site moisture and disturbance regimes.

Field	Plot		Origin			Moisture	
Plot	Number	Disturbed	Undisturbed	Unknown	Dry	Moist	Wet
TA1	1	D			D		
TA2	2	D			D		
TA3	3	D			D		
TA4	4	D			D		
TA5	5	D			D		
TA 5A	6		U		D		
TA6	7	D				M	
TA7	8	D			D		
TA8	9		U		D		
TA9	10	D			D		
TA10	11	D			D		
TA11	12	D			D		
TA12	13	D			D		
TA13	14	D				M	
TA14	15		U				W
TA15	16		U				W
TA16	17		U				W
TA17	18		U				W
TA18	19		U			M	
TA19	20			UNK		M	
Mald1	21	D				M	
Mald2	22	D				M	
Mald3	23	D				M	
Mald4	24	D				M	
Mald5	25	D				M	
Mald6	26	D				M	
Mald7	27	D				M	
Mald8	28	D				M	
Mald9	29	D			D		
Mald10	30	D				M	
Mald11	31	D				M	
Mald12	32			UNK			W
Mald13	33	D			D		
Mald14	34			UNK			W
Mald15	35			UNK		M	
Mald16	36	D			D		
Mald17	37			UNK			W
Mald18	38			UNK		M	
Mald19	39			UNK	D		
Mald20	40	D			D		
Mald21	41	D				M	
SK1	42	D				M	
SK2	43	D				M	
SK3	44	D				M	
SK4	45	D				M	

SK5	46	D				M	
SK6	47	D				M	
SK7	48			UNK		M	
SK8	49			UNK		M	
SK9	50	D				M	
SK10	51	D				M	
SK11	52	D				M	
SK12	53			UNK		M	
SK13	54			UNK		M	
SK14	55	D				M	
SK15	56	D				M	
Total	56	38	7	11	17	32	7

Table 2. A summary of the SYN-TAX analysis of alder plots, EAFB, 2000. Alphanumeric codes refer to respective outputs provided in an Appended packet.

Data Matrices	Analysis	Results	Results – Statistical Output
I. Data matrix was created from plots in which alders were the overstory species. (56 columns or plots, 79 rows or species)	Analysis was run on the data matrix using k-means clustering and range of rows algorithms. Both methods use sum of squares to determine distance between two objects (plots). Three clusters were specified after looking at biplot and bar graphs from ordination of data.	Clusters divided out by alder species, not whether disturbed, undisturbed or not known. Thus, one cluster consisted of plots dominated by *Alnus tenuifolia*, one by *A. crispa* and one by *A. crispa* var. *sinuata.*	**IA.** Alder2 plots (matrix) **IA1.** Dendrogram with plots alder2 **IA2.** k-means nonhierarchical output **IB.** Alder4 (matrix) **IB1.** Dendrogram with plots alder4 **IB2.** ORDIN output alder4 **IB3.** Bar graph alder4 **IB4.** Range of rows output alder4
II. Data matrix was created in which all species with less than 5% cover were omitted. (56 columns or plots, 51 rows or species)	Ordination bar graph indicated two clusters should be used. Non-hierarchical analysis using k-means clustering was run with two clusters specified.	One cluster consisted of plots in which *Alnus crispa* var. *sinuata* were the dominant overstory species. The other cluster consisted of plots in which either *Alnus tenuifolia* or *Alnus crispa* were the dominant overstory species.	**IIC.** Alder shrubs, no spp. <5% plots (matrix) **IIC1.** Biplot axes 1/3 no <5 **IIC2.** Scattergram axes 1/ 2 no <5% **IIC3.** Nonhierarchical output no spp <5%
III. Data matrix of just *Alnus crispa* var. *sinuata* plots was created. (33 columns or plots, 53 rows or species)	Ordination bar graph indicated two clusters should be used. Non-hierarchical analysis using k-means clustering was run with two clusters specified.	Clusters divided into one group mostly dominated by *Calamagrostis canadensis,* and another dominated by *Gymnocarpium dryopteris* and/or *Ribes triste*	**IIID.** *A. sinuata* plots (matrix) **IIID1.** Ordination output *A. sinuata* **IIID2.** Bar graph *A. sinuata* **IIID3.** Non-hierarchical output (k-means clustering) sinuata
IV. Data matrix using just the understory species' cover values. All values from alders were removed. Also, all species with less than 5% cover were removed from the analysis. (56 columns or plots, 48 rows or species)	Ordination and bar graph indicated two clusters should be run. Non-hierarchical analysis using k-means clustering was run with two clusters specified.	It appeared that one cluster consists of plots dominated mostly by *Calamagrostis canadensis* and another with a combination of higher cover of *Echinopanax horridum, Sambucus racemosa, Gymnocarpium dryopteris* and/or *Ribes triste*	**IVE.** Alder, no alder, no spp<5% **IVE1.** Ordination no alder, no spp <5% **IVE2.** Biplot axes 1vs2, no alder <5% **IVE3.** Bar graph no alder, no spp. <5% **IVE4.** Non-hierarchical no alder, no spp <5%

overstory species. The other cluster consisted of plots in which either thinleaf alder or American green alder were the dominant overstory species.

Since the larger cluster consisted of Sitka alder, a matrix was created with just those plots in which Sitka alder was present and analyzed separately to see whether undisturbed and disturbed plots could be determined within this subset (Table 2: III). Again there was no consistency on the difference between the disturbed and undisturbed plots based on a common association of species. The differences instead, appeared to center around the cover of a few of the understory species, and not necessarily related to whether a plot was disturbed or not.

Since the analysis was based on cover value of each species present in the plot, species with high cover tended to be what separated groups into different clusters; thus, for the final analysis the three alder species were removed from the data matrix (Table 2: IV). Analysis was again run, this time with two clusters specified. Disturbed and undisturbed plots did not separate out even when the overstory species were absent from the analysis. Thus, it seems that species composition is not a method to determine whether a site is of a disturbed or undisturbed origin.

ArcView GIS System for Alder

An ARCVIEW Project labeled ALDER1999 was created with a single View labelled EAFB. This View contains Themes including the: 1999 edited vegetation map of Elmendorf Air Force Base; alder field plot locations; alder base map; wet alder layer; alder likely caused by human disturbance; and alder not likely caused by human disturbance. Metadata layers are provided for each of the five Themes(Appendix 2).

The design of the GIS layers for the alder ArcView Project provides for a variety of queries to be made from each Theme as well as using the Themes in combination to assess site comparisons. For example, using the moisture and disturbance attributes for the alder survey sites, plots can be separated by moisture category as well as whether they are likely the result of human disturbance or in a natural state. This could prove useful for future separation of plots for management purposes. Using the other derivative layers of polygons other combinations of moisture and disturbance can be identified spatially, for example all disturbed wet sites can be separated from undisturbed wet areas.

The database is designed such that additional alder plot data can be added in the future by linking data tables to the PLOT_ID label.

DISCUSSION

The beginning of this discussion is excerpted from the earlier long-term monitoring project report (Tande et al. 2001) to complement this study's findings.

Three shrub species of alder occur in Southcentral Alaska and on EAFB: Sitka alder (*Alnus sinuata*), thinleaf alder (*A. tenuifolia*), sometimes referred to as *A. incana*), and American green alder (*A. crispa)* (Viereck and Little 1972).

Alder shrub communities are classified by Viereck et al. (1992) at Level IV as Open or Closed Tall Alder (Scrub) Shrub (IIB1b, IIB2b). They are represented on the Base by long-term monitoring plots (LTVMP) 18, 21 and 22 (Tande et al. 2001). Level V Plant Community Types observed on EAFB in 1999-2000 were:

Alnus sinuata/Echinopanax horridum

Alnus sinuata/Sambucus racemosa-Rubus idaeus-(Ribes triste)/Dryopteris dilatata-(Gymnocarpium dryopteris)

Alnus sinuata/Rubus idaeus/Calamagrostis canadensis

Alnus sinuata/Calamagrostis canadensis

Alnus sinuata/Calamagrostis canadensis (Osmorhiza depauperata)

Alnus sinuata/Equisetum arvense

Alnus tenuifolia/Calamagrostis canadensis (Equisetum fluviatile)

Alnus tenuifolia/Rubus idaeus-(Ribes triste)/Calamagrostis canadensis-(Dryopteris dilatata)

Tall closed alder stands are common at forest edges, on floodplains and along stream banks. In Southcentral Alaska, green alder commonly dominates uplands and well-drained floodplain sites, and Sitka alder dominates well-drained uplands and avalanche tracks (Viereck and Little 1972). Thinleaf alder occasionally will be dominant, but most thinleaf alder stands are shrub swamps (Viereck and Little 1972).

Sitka alder is the dominant alder type on EAFB, followed by thinleaf alder and occasional stands of green alder. Thinleaf alder dominates the wet shrub swamps and forest depressions common along the north side of the Elmendorf Moraine from Cook Inlet north to Green and Spring Lakes, around the Elephant Cage Communications Center and northeast to Hillberg Ski Area.

Very little work has been published on the successional status of alder species in Southcentral Alaska outside of its role in succession on river bars and glacial outwash plains (Collins and Helm 1997, Helm et al. 1984, Helm and Allen 1995, Helm and Collins 1997). Wurtz (1995, 2000) has recently investigated the silvicultural applications of alder transplants for natural nitrogen enhancement of white spruce revegetation on Southcentral and Interior Alaska logging sites.

Closed tall alder stands are a topoedaphic climax on many sites, including avalanche tracks, subalpine uplands and steep alpine slopes. In most instances, Subarctic lowland alder communities eventually will be replaced by forests; many have established themselves on sites disturbed by fire or land-clearing activities (Viereck et al. 1992).

Successional relations of thinleaf alder tall shrub swamp stands are for the most part unknown. The defining characteristic of these stands is an excess of moisture with standing water present throughout much of the growing season. These communities probably represent topoedaphic climaxes in many cases, and will persist as long as hydrologic conditions causing seepage and flooding exist on a site (Viereck et al. 1992). This is the case for most of the alder stands that exist southwest from Lower Six Mile Lake between the coast and the Elmendorf Moraine.

Wurtz (2000) provided the following summary on alder succession most applicable to EAFB:

> "On primary successional sites as reported from the Tanana River floodplain in the Interior of Alaska, alders and willows (*Salix* spp.) colonize newly deposited surfaces quickly; after 10 years, there may be as many as 40,000 stems per acre (100,000 stems per ha) (Van Cleve and Viereck 1981)… The dominant role of alders continues for the first 60 to 80 years of floodplain succession, until the balsam poplar (*Populus balsamifera*), and later white spruce (*Picea glauca*), canopies close overhead. Then, though their abundance and vigor decline, alders persist in the understory. Individual alder stems can be long lived (Wilson et al. 1985); the oldest stem for which age was determined ... was 75 years old. As individual stems mature and die back, new ones sprout from the same root crown...
>
> "On upland sites in interior Alaska, the most common disturbance is wildfire. In such

secondary successional sequences, alders occur as a scattered shrub layer beneath paper birch (*Betula papyrifera*) and aspen (*Populus tremuloides*). They reach their greatest influence 50 to 100 years after fire. Soil nitrogen reserves double during this period (Van Cleve and Viereck 1981). As the upland forest becomes dominated by white spruce, the importance of alder declines. But just as on floodplain sites, alders on upland sites persist throughout the later stages of succession as common, though scattered, components of the understory...

"Not all alders found in the understory of mature forests originate in an earlier successional stage. New individuals can establish from seed where localized disturbances such as windthrow have exposed mineral soil (Gilbert and Payette 1982) and created openings in the canopy. These new establishment events, however, seem infrequent (Huenneke 1987, Huenneke and Marks 1987). For the most part, alder stems in the understory of mature boreal forests are the most recent aboveground generation of a genetic individual that has occupied that spot for decades or even centuries...

"...On many sites in the boreal forest of Alaska, ... alders... grow rapidly... In Interior Alaska, both green and thinleaf alders rapidly colonize new roadsides and gravel pits. Green alder wildlings collected along roadsides grew rapidly after being planted in a tilled agricultural field and kept free of competing vegetation (Wurtz 1995). In the first year after planting, the wildlings doubled or tripled in height, and in the second year, many doubled again. At the same time, they were sprouting vigorously from the base of the main stem, so that after 3 years, individual plants had as many as 10 stems curving out and up from the base and a dense, rounded growth form.

"Although dense stands of *Calamagrostis canadensis* can prevent spruce from becoming established in a secondary successional site, white spruce seems to tolerate competition from alder. In many boreal forest successional sequences, white spruce grows naturally beneath a canopy of shrubby alder for years before gradually overtopping it and becoming the dominant species (Van Cleve and Viereck 1981)..."

Analysis of Disturbed vs Undisturbed Alder

All three species of alder occurring on EAFB may occupy disturbed sites, though our field work and subsequent analysis detected "disturbed" sites supporting only Sitka alder and American green alder (see attached Packet: IA1a). No disturbed thinleaf alder types attributable to human-related activities were sampled even though this disturbance factor was anticipated when the thinleaf alder plots were located and established. These thinleaf alder swamps may warrant further investigation in this regard as most thinleaf alder stands occur along riparian areas such as Ship Creek, where they mostly are not disturbed by human-related activities; conversely, other large areas of thinleaf alder occur on the north-northwesterly sides of the Elmendorf Moraine where increased development over time has taken place in the form of military development (e.g. Elephant's Cage) and a long homestead history. Most "wet" alder swamp sites recorded in the ArcView GIS database are thinleaf alder (Appendix 3).

Our analysis of alder sites suggests an inability to identify "disturbed" vs "undisturbed" alder sites based on their floristic composition. A more qualitative assessment of our field work follows, offering observations we hope will assist the Base land managers in their alder management decisions.

Upland Alder Sites

Aerial photo assessments of a site are a primary source for identifying alder with disturbed origins. These areas possess sharp polygon borders between cover types and features that are narrow and linear, square, circular, or rectangular in pattern, indicating that they are manmade in origin.

A review of a site in terms of EAFB military history may reveal known military construction, surveying activity, road and pipeline construction. Field assessments may reveal old building pads, foxholes and litter. The homesteading history of the Base may be important and is well-documented (Daugherty and Saleeby 1998) although the current investigation found no alder regeneration that could be specifically tied to any past homesteading event.

Given the homesteading history and a military presence in the coastal and western areas of the Base, there may be a considerable amount of disturbed alder sites in these areas whether we encountered disturbance indicators or not. Although homesteading on EAFB saw little land clearing, (Daugherty and Saleeby 1998), some of the more intense homesteading landuse occurred on the west end of the east-west runway, and partial land clearing possibly extended up and over the Moraine to as far north as Six Mile Creek. The military also had a significant coastal defensive posture especially in the 1940's and early 1950's.

More recently, large segments of the area south of the mouth of Six Mile Creek appear to have been cleared and are now used for an antenna field complex. The area is largely dominated by alder. Portions may have been a borrow pit for materials for the Six Mile Lake dam but this has not been verified. We believe that a large part of this area would be classified as "disturbed" alder growth; however, fieldwork ground-truthing was hampered in this area as much of the zone was off limits and gated in 2000.

Sitka alder and green alder typify dry to moist "disturbed" and "undisturbed" sites although their presence alone cannot be used to decide whether alder is " invasive " due to changes in ecosystem conditions. Disturbed upland sites have a sense of being sterile and less productive to a professional vegetation ecologist. They may possess a species-depauperate understory, sometimes with no associated species at all. These sites generally are a dense, nearly impenetrable thicket commonly referred to as "doghair", and possess a shallow duff layer consisting of nothing more than alder leaves on a compacted gravelly substrate. These conditions may be more commonly encountered on old trails or along road margins. Many of the linear and regularly geometric features evident on the 1983 vegetation map (Tande 1983) fit this model. LTVMP 21 (Tande et al. 2001) and Plots TA 1, 2, 10 and 11 (this study) are representative of old bladed construction pads or bunker sites. The latter are generally flat and well-drained with a dry to moist moisture regime.

These upland alder sites will gradually experience the regrowth or invasion of species typical of surrounding vegetation types, evident in our dataset by such species as *Ribes* spp., *Gymnocarpium dryopteris*, *Dryopteris dilatata*, *Equisetum* spp., *Trientalis europaea* and *Calamagrostis canadensis.* Forest tree species regeneration remains low for many years.

These forested species may also be indicative of a more "natural" alder site where alder was a former complementary species in an Open Old-Growth Forest Type that has since been thinned by aged, disease, insects and wind. Here the alder may have always been present as rootstock occupying nonforested openings where it was associated with bluejoint grass or alternated with bluejoint grass meadow openings.

Our experience shows that these more "natural" alder stands exhibit a strong compliment of forest species and bluejoint grass, occupying a hummocky or pitted topography that is characteristic of Open Old-Growth Forest cover types common in Southcentral Alaska and a dominant forest type on EAFB (Tande 1983). They also have a substantially greater organic soil layer. It is anticipated that any association with human-caused disturbance would be localized and related to forest cutting or thinning activities, or to cutlines where the terrain features generally remain intact and no evidence of blading and leveling are evident.

Wet Alder Sites

Wet alder - thinleaf alder shrub swamp - is a common natural association with Old-Growth Forest

that occurs southwest from Lower Six Mile Lake between the coast and the north side of the Elmendorf Moraine, and in riparian areas such as the Ship Creek corridor. This alder covertype is common in Southcentral Alaska and has been previously described locally by Hogan and Tande (1983) for the Klatt Bog wetland complex on the south side of Anchorage. Swamp forests are reported to make one of the most significant contributions to boreal forest biodiversity in an otherwise impoverished forest landscape (Hörnberg et al. 1998). The biological diversity of swamp forests is high relative to that of the surrounding boreal landscape, possibly because swamp forests provide a multitude of ecological niches on a wide hydrotopographical gradient, ranging from dry hummocks and tree bases to permanently water-filled hollows.

These swamp forest/alder shrub swamp types appear to be the result of naturally impaired drainage on EAFB. Old-growth swamp forest becomes quite open moving from the coast northeast towards Hillberg Lake. The principal forms of localized disturbance noted in this area were: localized ditching; parking lot fill near the Elephant Cage Communications facility; construction zones around these facilities; roadway hydroaxing; and east-west utility corridors running from the Base facilities proper over the Elmendorf Moraine to the Communication Complex. The latter represent cuts through Open to Closed Old-Growth Forest/Alder/Bluejoint community types, grading east to the drier upland Old-Growth Forest complement characteristic of the Moraine itself. These were the only observations attributable to disturbance in permanent- to semipermanently-flooded alder sites observed in 1999-2000; we found no evidence to suggest that the larger expanses of thinleaf alder shrub swamp were anything but "natural" alder shrub swamp. To reclaim these cut lines and utility corridors currently occupied by Bluejoint Meadow would be to reclaim sites by planting thinleaf alder itself.

Discussion of the ArcView GIS System for Alder

The ArcView GIS product produced by Colorado State University, Fort Collins-Center for the Ecological Management of Military Lands (CEMML), and provided to AKNHP by EAFB Conservation and Environmental Planning staff, proved to be less than adequate in terms of its GIS edits. AKNHP staff worked closely with Steve Drake, CEMML-Fort Richardson Army Base, to edit the polygons for the alder layer so we could proceed with our contractual arrangements with EAFB in a timely manner, and enter our 1999-2000 field interpretations to the alder layer. Both EAFB and CEMML staff were instrumental in expediting the production of this alder base layer.

Alder GIS results consisted of an ArcView Project (Alder99) made up of one View (EAFB); the View is made up of four Themes: 1) all Alder, where Types 20/21 are dominant; 2) Disturbed Alder; 3) Alder Shrub Swamp (wet sites); and 4) 1999-2000 alder sample plots. Examples of the GIS are found in Appendix 3. Alder sample plots included designations for disturbed, undisturbed and unknown categories in the Attribute File in terms of their vegetation history and potential stand origins.

With regards to the ArcView GIS, the 1983 map scale was 1: 12000 (1 in =1,000 ft). Alder delineations are generally limited to large polygons at this scale; many smaller inclusions exist within all large map polygons, especially Old-Growth Forest in upland and riparian habitats (e. g., the Ship Creek corridor). In these cover types, alder stands intermingle with forest and bluejoint meadows. Consequently, the total extent of alder on the Base may be underestimated, as is the extent of alder shrub swamp (the latter is intermingled with the old growth along the north-northwest side of the Elmendorf Moraine).

Another example is the Type 20 around the Elephant Cage Communications facility which is classified as undisturbed alder; here there is a zone of disturbed alder in the vicinity of the perimeter that is indeed disturbed. This situation also occurs along most roadways and in the antenna field southwest of Lower Six Mile Lake. A more accurate assessment or indication of disturbed and

undisturbed alder shrub swamp, and additional alder shrub forest inclusions is indicated on the draft field map in the field data file for this project stored at the Conservation and Environmental Planning Office.

Alder types along most roadways and around many building complexes have been hydroaxed regularly. Hydroax clearing is very common in the antenna field areas of the Base. These are not necessarily indicated by ArcView GIS or on the field map.

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Appendices

Appendix 1. A list of plant species encountered in vegetation sampling on EAFB in 1999-2000 with their respective codes, scientific epithets and common names.

CODE	SCIENTIFIC NAME	COMMON NAME
VASCULAR SPECIES		
ACHI MILL	Achillea millefolium	Yarrow
ACTA RUBR	Actaea rubra	Baneberry
AGRO SCAB	Agrostis scabra	Hair bentgrass
ALNU CRIS	Alnus crispa	American green alder
ALNU SINU	Alnus crispa ssp. sinuata	Sitka alder
ALNU TENU	Alnus tenuifolia	Thinleaf alder
ANDR POLI	Andromeda polifolia	Bog rosemary
ANEM SPPC	Anemone species	Anemone
ANGE LUCI	Angelica lucida	Wild celery
ARCT UVAU	Arctostaphylos uva-ursi	Bearberry
ARNI AMPL	Arnica amplexicaulis	Arnica
ARTE TILE	Artemisia tilesii	Tall wormwood
ATHY FILI	Athyrium filix-femina	Lady fern
BETU PAPY	Betula papyrifera	Paper birch
BETU PASA	Betula papyrifera sapling	Paper birch sapling
BETU PASE	Betula papyrifera seedling	Paper birch seedling
BOSC ROSS	Boschniakia rossica	Broomrape
CALA CANA	Calamagrostis canadensis	Bluejoint grass
CARE CANA	Carex canescens	Silvery sedge
CARE SPE1	Carex species 1	Sedge species 1
CARE SPE2	Carex species 2	Sedge species 2
CARE UTRI	Carex utriculata	Beaked sedge
CICU MACK	Cicuta mackenzeii	Water hemlock
CORN CANA	Cornus canadensis	Dwarf dogwood
DELP GLAU	Delphinium glaucum	Larkspur
DRYO DILA	Dryopteris dilatata	Wood fern
ECHI HORR	Echinopanax horridum	Devil's club
EMPE NIGR	Empetrum nigrum	Crowberry
EPIL ANGU	Epilobium angustifolium	Fireweed
EPIL PALU	Epilobium palustre	Willow herb
EQUI ARVE	Equisetum arvense	Common horsetail
EQUI FLUV	Equisetum fluviatile	Horsetail
EQUI SILV	Equisetum sylvaticum	Horsetail
GALI BORE	Galium boreale	Northern bedstraw
GALI TRID	Galium trifidum	Small bedstraw
GALI TRIF	Galium triflorum	Sweet-scented bedstraw
GEOC LIVI	Geocaulon lividum	Pumpkin berry
GEUM MACR	Geum macrophyllum	Large-leaf avens

CODE	SCIENTIFIC NAME	COMMON NAME
GOOD REPE	Goodyera repens	Rattlesnake plantain
GYMN DRYO	Gymnocarpium dryopteris	Oak fern
HERA LANA	Heracleum lanatum	Cow parsnip
LEDU DECU	Ledum palustre ssp. decumbens	Narrow-leaf Labrador tea
LEDU GROE	Ledum groenlandicum	Labrador tea
LINN BORE	Linnaea borealis	Twin flower
LUPI NOOT	Lupinus nootkatensis	Nootka lupine
LUZU MULT	Luzula multiflora	Rush
LYCO ANNO	Lycopodium annotinum	Stiff club moss
LYCO CLAV	Lycopodium clavatum	Club moss
MENZ FERR	Menziesia ferruginea	Rusty menziesia
MOEH LATE	Moehringia lateriflora	Grove starwort
OSMO DEPA	Osmorhiza depauperata	Sweet cicely
OXYC MICR	Oxycoccus microcarpus	Bog cranberry
PARN PALU	Parnassia palustris	Grass of Parnassus
PEDI LABR	Pedicularis labradorica	Labrador lousewort
PEDI SPPC	Pedicularis species	Lousewort species
PICE GLAU	Picea glauca	White spruce
PICE GLSA	Picea glauca sapling	White spruce sapling
PICE GLSE	Picea glauca seedling	White spruce seedling
PICE MARI	Picea mariana	Black spruce
PICE MASA	Picea mariana sapling	Black spruce sapling
PICE MASE	Picea mariana seedling	Black spruce seedling
PLAN SPPC	Plantago species	Plantain
POAA PRAT	Poa pratensis	Grass
POLE ACUT	Polemonium acutiflorum	Tall Jacob's ladder
POPU BALS	Populus balsamifera	Balsam poplar
POPU TREM	Populus tremuloides	Quaking aspen
POPU TRSA	Populus tremuloides sapling	Quaking aspen sapling
POTE PALU	Potentilla palustris	Marsh five-finger
PYRO ASAR	Pyrola asarifolia	Pink pyrola/Wintergreen
PYRO SECU	Pyrola secunda	Sidebells pyrola
PYRO SPPC	Pyrola species	Wintergreen/Pyrola
RANU SPPC	Ranunculus species	Buttercup
RIBE BRAC	Ribes bracteosum	Stink currant
RIBE HUDS	Ribes hudsonianum	Northern black currant
RIBE LAXI	Ribes laxiflorum	Trailing black currant
RIBE TRIS	Ribes triste	American red currant
ROSA ACIC	Rosa acicularis	Prickly rose
RUBU CHAM	Rubus chamaemorus	Cloudberry
RUBU IDEA	Rubus idaeus	American red raspberry
RUBU PEDA	Rubus pedatus	Five-leaf bramble

CODE	SCIENTIFIC NAME	COMMON NAME
RUBU SPPC	Rubus species	Raspberry
RUME ACET	Rumex acetosa	Sorrel
SALI BEBB	Salix bebbiana	Bebb willow
SALI SPPC	Salix species	Willow
SAMB RACE	Sambucus racemosa	Pacific red elder
SANG STIP	Sanguisorba stipulata	Sitka burnet
SHEP CANA	Shepherdia canadensis	Soapberry
SORB SCOP	Sorbus scopulina	Mountain ash
SPIR BEAU	Spiraea beauverdiana	Beauverd spirea
STEL SPPC	Stellaria species	Chickweed
STRE AMPL	Streptopus amplexifolius	Twisted stalk
TARA OFFI	Taraxacum officinale	Dandelion
THAL SPAR	Thalictrum sparsiflorum	Few-flowered meadow rue
TRIE EURO	Trientalis europaea	Star flower
TRIF SPPC	Trifolium species	Clover
UNKN GRAM	Unknown grass	Grass
URTI GRAC	Urtica dioica spp. gracilis	Stinging nettle
VACC ULIG	Vaccinium uliginosum	Bog blueberry
VACC VITI	Vaccinium vitis-idaea	Lowbush cranberry
VIBU EDUL	Viburnum edule	Highbush cranberry
MOSSES		
CERA PURP	Ceratodon purpureus	Fire moss
DICR SPPC	Dicranum species	Broom moss
DREP SPPC	Drepanocladus species	Hook moss
EURY PULC	Eurynchium pulchellum	Common beaked moss
HYLO SPLE	Hylocomium splendens	Stair/Step feathermoss
MNIU SPPC	Mnium species	Leafy moss
MOSS SPP1	Moss species 1	Moss species 1
PARM SPPC	Parmelia species	
PLEU SCHR	Pleurozium schreberi	Red-stemmed feathermoss
POLY JUNI	Polytrichum juniperinum	Juniper moss
POLY SPPC	Polytrichum species	
PTIL CRIS	Ptilium crista-castrensis	Knight's plume feathermoss
RHYT TRIQ	Rhytidiadelphus triquetrus	
SPHA GIRG	Sphagnum girgenshohnii	White-toothed peat moss
SPHA GREE	Sphagnum green	Green peat moss species
SPHA SPPC	Sphagnum species	Peat moss species
TOME NITE	Tomenthypnum nitens	Golden fuzzy fen moss
LICHENS		
CLAD RANG	Cladina rangiferina	Grey reindeer lichen
CLAD SPPC	Cladonia species	Lichen

CODE	SCIENTIFIC NAME	COMMON NAME
LOBA LINI	Lobaria linita	Lung lichen
LOBA SPPC	Lobaria species	Lung lichen species
NEOH ARCT	Nephroma arcticum	Kidney lichen
PELT APHT	Peltigera aphthosa	Studded leather lichen
PELT CANI	Peltigera canina	Dog lichen
PELT MALA	Peltigera malacea	Box board felt lichen
PELT MEMB	Peltigera membranacea	Felt lichen
PELT NEOP	Peltigera neopolydactyla	Finger felt lichen
PELT SPPC	Peltigera species	Felt lichen
UNKN YELL	Unknown yellow lichen	Unknown yellow lichen

5/23/2000

Appendix 2. Alder ArcView GIS Summary/Description.

All files produced using ArcView 3.2

Alder GIS

Project 1 = ALDER99

View1 = EAFB

Themes

1. **VEG83.SHP** = Edited 1983 vegetation shape file. Contains the following attribute items:

    ALDER = A -

    Moisture = WET – Alder stands on sites with excess moisture and standing water throughout much of the year

    Disturb
    D - Alder encroachment likely due to human disturbance
    N – Alder encroachment not likely due to human disturbance

2. **99ALDER.SHP** – Derivative shape file from VEG83.SHP. Alder base map for EAFB. Those areas with alder type as primary vegetation community.

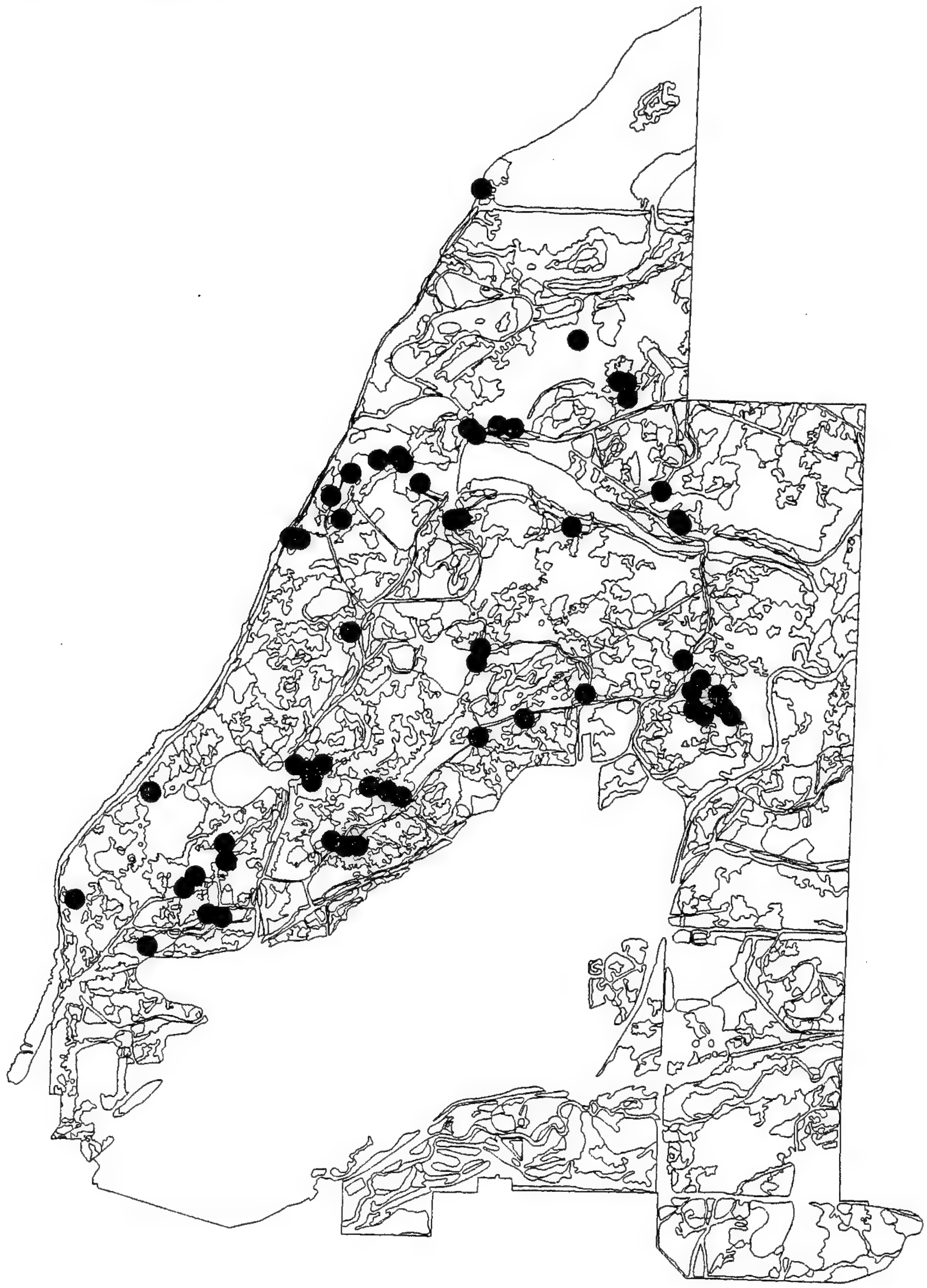
3. **WETALDER.SHP** – Derivative shape file from VEG83.SHP. Alder stands with excess moisture and standing water throughout much of the year.

4. **DISTURBEDALDER.SHP** – Derivative shape file from VEG83.SHP. Sites where alder encroachment likely due to human disturbance.

5. **UNDISTURBEDALDER.SHP** - Derivative shape file from VEG83.SHP. Sites where alder encroachment is not likely due to human disturbance.

Appendix 3. Example maps from ArcView GIS for an alder study on EAFB, 1999 - 2000

Alder Plot Locations



Appendix 3. Example maps from ArcView GIS for an alder study on EAFB, 1999 - 2000

Wet Alder Sites
Alder Stands on Sites With Excess
Moisture and Standing Water Present
Throughout Much of the Year

Appendix 3. Example maps from ArcView GIS for an alder study on EAFB, 1999 - 2000

Alder Encroachment Likely Due to Human Disturbance

Appendix 3. Example maps from ArcView GIS for an alder study on EAFB, 1999 - 2000

Alder Encroachment Not Likely Due to Human Disturbance

Appendix 4.

ArcView GIS Metadata for the disturbed alder study, 1999.

Appendix 4A. Metadata for ArcView GIS (WETALDER.MET).

IDENTIFICATION_INFORMATION

Citation:
 Citation_Information:
  Originator: Alaska Natural Heritage Program
  Publication_Date: 20001230
  Title: Vegetation Community Types on Elmendorf Air Force Base
  Edition: 2000
  Geospatial_Data_Presentation_Form: Digital File
  Publication_Information:
   Publication_Place:
   Publisher:
  Other_Citation_Details:
  Online_Linkage:
  Larger_Work_Citation:
   Citation_Information:
    Originator: Alaska Natural Heritage Program
    Publication_Date: 20001230
    Title: Identification and characterization of disturbed alder sites Elmendorf Air Force Base, Alaska
    Publication_Information:
     Publication_Place:
     Publisher:
    Online_Linkage:
Description:
 Abstract:
  The VEG83WETALDER.SHP file is a polygon feature shape file generated from the VEGEDIT.E00 file supplied by CMMEL. This original digital product was produced from the. This shape file includes all alder vegetation communities in which alder dominated sites have excess moisture and standing water present throughout much of the year on Elmendorf Air Force Base. This shape file is used as a theme for the GI constructed as part of the Alder Characterization project conducted by the Alaska Natural Heritage Program for the Natural Resources Branch at Elmendorf AFB in 1999.
 Purpose:
  The shape file is used to reference the location of wet alder communities present on EAFB in which there is excess moisture and standing water is present throughout much of the year. These alder types are present in a natural state and disturbed state .This derivitive product can be used by base personnel to get an overview of wet alder sites across EAFB.

.

 Supplemental_Information:
Time_Period_of_Content:
 Time_Period_Information:
  Range_of_Dates/Times:
   Beginning_Date: 199906

Ending_Date: 200008
Currentness_Reference:
Status:
Progress: Complete
Maintenance_and_Update_Frequency: None planned
Spatial_Domain:
Bounding_Coordinates:
West_Bounding_Coordinate: 346032.5949
East_Bounding_Coordinate: 352223.6588
North_Bounding_Coordinate: 6801215.7900
South_Bounding_Coordinate: 6794837.1181
Keywords:
Theme:
Theme_Keyword_Thesaurus: None
Theme_Keyword: VEGETATION
Theme_Keyword: ALDER VEGETATION TYPES
Theme_Keyword: WETLANDS
Place:
Place_Keyword_Thesaurus: None
Place_Keyword: ELMENDORF AFB
Place_Keyword: ALASKA
Access_Constraints:
Approved for public release. Distribution unlimited.
Use_Constraints:
None
Point_of_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Natural Resources Branch Elmendorf AFB
Contact_Person: Ms. Kate Wedemeyer
Contact_Position: Wildlife Biologist
Contact_Address:
Address_Type: mailing and physical address
Address: 6326 Arctic Warrior Drive
City: Elmendorf Air Force Base
State_or_Province: Alaska
Postal_Code: 99506
Country: USA
Contact_Voice_Telephone:
Contact_Facsimile_Telephone:
Contact_Electronic_Mail_Address:
Hours_of_Service:
Native_Data_Set_Environment:
ArcView version 3.2 shapefile format
c:\elmendorf\alder\wetalder.shp

DATA_QUALITY_INFORMATION

Attribute_Accuracy:
Attribute_Accuracy_Report:
Logical_Consistency_Report:
Completeness_Report:
The WETALDER shape file is a derivitive map of all alder vegetation map (1999ALDER.SHP) classes from the digital file of the 1983 vegetation map produced by G. Tande.
Moisture regimes of alder polygons was field checked by AKNHP personnel in the summers of 1999 and 2000. Indicators of naturally occurring alder communities were identified in the field or interpreted using color infra-red photography. A "WET" rating was assigned to each alder polygon by the program's ecologist to indicate excess moisture conditions present throughout the year.
Positional_Accuracy:
Horizontal_Positional_Accuracy:
Horizontal_Positional_Accuracy_Report:
Unknown
Vertical_Positional_Accuracy:
Vertical_Positional_Accuracy_Report:
Lineage:
Source_Information:
Source_Citation: Tande, G.F., S.C. Klein, and J.Michaelson. 2000. Establishment and characterization of disturbed alder sites on Elmendorf Air Force Base, Alaska. Rep. Prep. For: Natural resources Branch, 3/CES/CEVPW, 6326 Arctic Warrior Dr., Elmendorf AFB, AK. Contract No. DAMD17-99-2-9004. U.S. Army Medical Research and Material Command, Ft. Detrick, MD. 21702-5012. Alaska Natural Heritage Program, Environment and Natural resources Institute, University of Alaska Anchorage, 707 A St., Anchorage, Alaska.
Citation_Information:
Originator: Alaska Natural Heritage Program, Environment and Natural Resources Institute, University of Alaska Anchorage
Publication_Date: 20001230
Title: Identifications and characterization of disturbed alder sites on Elmendorf Air Force Base, Alaska
Edition:
Geospatial_Data_Presentation_Form: Digital Map
Publication_Information:
Publication_Place: Anchorage, Alaska
Publisher:
Other_Citation_Details:
Online_Linkage:
Larger_Work_Citation:
Citation_Information:
Originator:
Publication_Date:
Title:
Publication_Information:
Publication_Place:

Publisher:
Online_Linkage:
Source_Scale_Denominator:
Type_of_Source_Media: electronic
Source_Time_Period_of_Content:
Time_Period_Information:
Range_of_Dates/Times:
Beginning_Date: 199906
Ending_Date: 200008
Source_Currentness_Reference:
Source_Citation_Abbreviation:
Source_Contribution:

The sourcemap is a theme constructed for the GIS produced for the alder identification and characterization project. The sourcemap is labeled 1999ALDER.shp

Process_Step:
Process_Description:

Using the alder basemap for Elmendorf Air Force Base, a query was performed to extract wet alder community types. This file, WETALDER.shp is the result for all those polygons with 'MOISTURE' field labeled, "WET". This shape file was added as a theme into the Alder Identification and Characterization project GIS.

Source_Used_Citation_Abbreviation:
Process_Date: 20001130
Source_Produced_Citation_Abbreviation:
Process_Contact:
Contact_Information:
Contact_Person_Primary:
Contact_Organization: Alaska Natural Heritage Program
Contact_Person: Julie Michaelson
Contact_Position: Data Manager
Contact_Address:
Address_Type: mailing and physical address
Address: 707 A Street
City: Anchorage
State_or_Province: Alaska
Postal_Code: 99503
Country: USA
Contact_Voice_Telephone: (907)257-2781
Contact_Facsimile_Telephone:
Contact_Electronic_Mail_Address: anjam1@uaa.alaska.edu
Hours_of_Service:

SPATIAL_DATA_ORGANIZATION_INFORMATION

Direct_Spatial_Reference_Method:
Point_and_Vector_Object_Information:
SDTS_Terms_Description:

SDTS_Point_and_Vector_Object_Type: Polygon
Point_and_Vector_Object_Count: 53

SPATIAL_REFERENCE_INFORMATION

Horizontal_Coordinate_System_Definition:
Planar:
Map_Projection:
Planar_Coordinate_Information:
Planar_Coordinate_Encoding_Method:
Coordinate_Representation:
Abscissa_Resolution: 2.540000000000
Ordinate_Resolution: -2.54000000000
Planar_Distance_Units: meters
Geodetic_Model:
Horizontal_Datum_Name: North American Datum of 1927
Ellipsoid_Name: Clarke 1866
Semi-major_Axis: 6,378,206.4
Denominator_of_Flattening_Ratio: 294.98

ENTITY_AND_ATTRIBUTE_INFORMATION

Detailed_Description:
Entity_Type:
Entity_Type_Label: wetalder.dbf
Entity_Type_Definition: Shapefile Attribute Table
Entity_Type_Definition_Source: None
Attribute:
Attribute_Label:
Attribute_Definition:
Attribute_Definition_Source:
Attribute_Domain_Values:
Unrepresentable_Domain:
Attribute:
Attribute_Label: PRIMARY
Attribute_Definition: 1Primary vegetation code 20 or 21
Attribute_Definition_Source: Attribute_Domain_Values:
Unrepresentable_Domain: Character Field
Attribute:
Attribute_Label: Attribute_Code
Attribute_Definition_Source: Viereck vegetative community code
Attribute_Domain_Values:
Unrepresentable_Domain: Character Field
Attribute:
Attribute_Label: Description
Attribute_Definition: Definition: Viereck description of the alder vegetation type

Attribute_Definition_Source: CMMEL automation of the 1983 vegetation map by Tande.
Attribute_Domain_Values:
Unrepresentable_Domain: Character Field
Attribute:
Attribute_Label: Alder
Attribute_Definition: A = alder is the primary vegetation type
Attribute_Definition_Source: AKNHP
Attribute_Domain_Values:
Unrepresentable_Domain: Character Field
Attribute:
Attribute_Label: MOISTURE
Attribute_Definition: WET = Moisture and standing water present throughout much of the year.
Attribute_Definition_Source: AKNHP
Attribute_Domain_Values:
Unrepresentable_Domain: Character Field
Attribute:
Attribute_Label: DISTURBANCE
Attribute_Definition: D = alder encroachment is likely due to human disturbance. N = alder encroachment is not likely due to human disturbance
Attribute_Definition_Source: AKNHP
Attribute_Domain_Values:
Unrepresentable_Domain: Character Field

DISTRIBUTION_INFORMATION

Distributor:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Natural Resources Branch Elmendorf Air Force Base
Contact_Person: Kate Wedemeyer
Contact_Position: Wildlife Biologist
Contact_Address:
Address_Type: mailing and physical address
Address: 6326 Arctic Warrior Drive
City: Elmendorf Air Force Base
State_or_Province: Alaska
Postal_Code: 99506
Country: USA
Contact_Voice_Telephone:
Contact_Facsimile_Telephone:
Contact_Electronic_Mail_Address:
Hours_of_Service:
Resource_Description:
Distribution_Liability:
Although these data have been processed successfully on a
computer system at AKNHP no warranty expressed or implied

is made by AKNHP regarding the use of the data on any other system, nor does the act of distribution constitute such warranty.
Standard_Order_Process:
Digital_Form:
Digital_Transfer_Information:
Format_Name:ArcView shape file
Digital_Transfer_Option:
Offline_Option:
Offline_Media:
Recording_Format: 3.2
Compatibility_Information:
ArcView GIS
Fees:
Ordering_Instructions:
Contact EAFB - Natural Resources Branch

METADATA_REFERENCE_INFORMATION

Metadata_Date: 20001220
Metadata_Review_Date: 20001220
Metadata_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Alaska Natural Heritage Program
Contact_Person: Julie Michaelson
Contact_Position: Data Manager
Contact_Address:
Address_Type: Mailing and physical address
Address: 707 A Street
City: Anchorage
State_or_Province: Alaska
Postal_Code: 99503
Country: USA
Contact_Voice_Telephone: (907)257-2781
Contact_Facsimile_Telephone:
Contact_Electronic_Mail_Address:
Hours_of_Service:
Metadata_Standard_Name: FGDC CSDGM
Metadata_Standard_Version: FGDC-STD-001-1998

Appendix 4B. Metadata for ArcView GIS (UNDISTALDER.MET).

IDENTIFICATION_INFORMATION

Citation:
Citation_Information:
Originator: Alaska Natural Heritage Program
Publication_Date: 20001230
Title: Undisturbed Alder Community Types on Elmendorf Air Force Base
Edition: 2000
Geospatial_Data_Presentation_Form: Digital File
Publication_Information:
Publication_Place:
Publisher:
Other_Citation_Details:
Online_Linkage:
Larger_Work_Citation:
Citation_Information:
Originator: Alaska Natural Heritage Program,Environment and Natural Resources Institute, University of Alaska Anchorage for Elmendorf Air Force Base, Natural Resources Branch
Publication_Date: 20001230
Title: Identification and characterization of disturbed alder sites Elmendorf Air Force Base, Alaska
Publication_Information:
Publication_Place:
Publisher:
Online_Linkage:
Description:
Abstract:
The UNDISTURBALDER.SHP file is a derivitive polygon feature shape file generated from the 1999ALDER.SHP file . This shape file includes all alder vegetation communities in which alder encroachment is not likely due to human disturbance on Elmendorf Air Force Base. This shape file is used as a theme in the GIS constructed for the Alder Characterization project performed by the Alaska Natural Heritage Program for the Natural Resources Branch at Elmendorf AFB in 1999.
Purpose:
The shape file is used to reference the location of primary alder communities present on EAFB in which alder encroachment is not likely due to human activity. These alder types are in a natural state and are linked to be formed by a natural successional process. This derivitive product can be used by base personnel to get an overview of undisturbed alder sites across EAFB.

Supplemental_Information:
Time_Period_of_Content:
Time_Period_Information:
Range_of_Dates/Times:
Beginning_Date: 199906
Ending_Date: 200008

Currentness_Reference:
Status:
Progress: Complete
Maintenance_and_Update_Frequency: None planned
Spatial_Domain:
Bounding_Coordinates:
West_Bounding_Coordinate: 346032.5949
East_Bounding_Coordinate: 352223.6588
North_Bounding_Coordinate: 6801215.7900
South_Bounding_Coordinate: 6794837.1181
Keywords:
Theme:
Theme_Keyword_Thesaurus: None
Theme_Keyword: VEGETATION
Theme_Keyword:
Theme_Keyword:
Place:
Place_Keyword_Thesaurus: None
Place_Keyword: ELMENDORF AFB
Place_Keyword: ALASKA
Access_Constraints:
Approved for public release. Distribution unlimited.
Use_Constraints:
None
Point_of_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Natural Resources Branch Elmendorf AFB
Contact_Person: Ms. Kate Wedemeyer
Contact_Position: Wildlife Biologist
Contact_Address:
Address_Type: mailing and physical address
Address: 6326 Arctic Warrior Drive
City: Elmendorf Air Force Base
State_or_Province: Alaska
Postal_Code: 99506
Country: USA
Contact_Voice_Telephone:
Contact_Facsimile_Telephone:
Contact_Electronic_Mail_Address:
Hours_of_Service:
Native_Data_Set_Environment:
ArcView version 3.2 shapefile format
c:\elmendorf\alder\undistalder.shp

DATA_QUALITY_INFORMATION

Attribute_Accuracy:
Attribute_Accuracy_Report:
Logical_Consistency_Report:
Completeness_Report:
The UNDISTURBALDER shape file is a derivitive map from all alder vegetation map (1999ALDER.SHP) classes from the digital file of the 1983 vegetation map produced by G. Tande. Disturbance was field checked by AKNHP personnel in the summers of 1999 and 2000. Indicators of naturally occurring alder communities were identified in the field or interpreted using color infra-red photography. A "Natural" or "Undisturbed" rating was assigned to each alder polygon by the program's ecologist.
Positional_Accuracy:
Horizontal_Positional_Accuracy:
Horizontal_Positional_Accuracy_Report:
Unknown
Vertical_Positional_Accuracy:
Vertical_Positional_Accuracy_Report: Unknown
Lineage:
Source_Information:
Source_Citation: Tande, G.F., S.C. Klein, and J.Michaelson. 2000. Establishment and characterization of disturbed alder sites on Elmendorf Air Force Base, Alaska. Rep. Prep. For: Natural resources Branch, 3/CES/CEVPW, 6326 Arctic Warrior Dr., Elmendorf AFB, AK. Contract No. DAMD17-99-2-9004. U.S. Army Medical Research and Material Command, Ft. Detrick, MD. 21702-5012. Alaska Natural Heritage Program, Environment and Natural Resources Institute, University of Alaska Anchorage, 707 A St., Anchorage, Alaska.
Citation_Information:
Originator: Alaska Natural Heritage Program, Environment and Natural Resources Institute, University of Alaska Anchorage
Publication_Date: 20001230
Title: Identifications and characterization of disturbed alder sites on Elmendorf Air Force Base, Alaska
Edition:
Geospatial_Data_Presentation_Form: Digital Map
Publication_Information:
Publication_Place: Anchorage, Alaska
Publisher:
Other_Citation_Details:
Online_Linkage:
Larger_Work_Citation:
Citation_Information:
Originator:
Publication_Date:
Title:
Publication_Information:
Publication_Place:
Publisher:

Online_Linkage:
Source_Scale_Denominator:
Type_of_Source_Media: electronic
Source_Time_Period_of_Content:
Time_Period_Information:
Range_of_Dates/Times:
Beginning_Date: 199906
Ending_Date: 200008
Source_Currentness_Reference:
Source_Citation_Abbreviation:
Source_Contribution:
The sourcemap is a theme of the GIS produced for the alder identification and characterization project. This theme is based on 1983 Tande Vegetation map updated by fieldwork 1999.
Process_Step:
Process_Description:
Using the alder basemap for Elmendorf Air Force Base, 1999ALDER.shp a query of all undisturbed classes with DISTURBANCE equal to "N" was made. From this query a new shape file labeled UNDISTURBALDER.SHP was produced. This shape file was added as a theme into the Alder Identification and Characterization project GIS.
Source_Used_Citation_Abbreviation:
Process_Date: 20001130
Source_Produced_Citation_Abbreviation:
Process_Contact:
Contact_Information:
Contact_Person_Primary:
Contact_Organization: Alaska Natural Heritage Program
Contact_Person: Julie Michaelson
Contact_Position: Data Manager
Contact_Address:
Address_Type: mailing and physical address
Address: 707 A Street
City: Anchorage
State_or_Province: Alaska
Postal_Code: 99503
Country: USA
Contact_Voice_Telephone: (907)257-2781
Contact_Facsimile_Telephone:
Contact_Electronic_Mail_Address: anjam1@uaa.alaska.edu
Hours_of_Service:

SPATIAL_DATA_ORGANIZATION_INFORMATION

Direct_Spatial_Reference_Method:
Point_and_Vector_Object_Information:
SDTS_Terms_Description:
SDTS_Point_and_Vector_Object_Type: Polygon

Point_and_Vector_Object_Count: 80

SPATIAL_REFERENCE_INFORMATION

Horizontal_Coordinate_System_Definition:
Planar:
Map_Projection:
Planar_Coordinate_Information:
Planar_Coordinate_Encoding_Method:
Coordinate_Representation:
Abscissa_Resolution: 2.540000000000
Ordinate_Resolution: -2.54000000000
Planar_Distance_Units: meters
Geodetic_Model:
Horizontal_Datum_Name: North American Datum of 1927
Ellipsoid_Name: Clarke 1866
Semi-major_Axis: 6,378,206.4
Denominator_of_Flattening_Ratio: 294.98

ENTITY_AND_ATTRIBUTE_INFORMATION

Detailed_Description:
Entity_Type:
Entity_Type_Label: undisturb.dbf
Entity_Type_Definition: Shapefile Attribute Table
Entity_Type_Definition_Source: None
Attribute:
Attribute_Label:
Attribute_Definition:
Attribute_Definition_Source:
Attribute_Domain_Values:
Unrepresentable_Domain:
Attribute:
Attribute_Label: PRIMARY
Attribute_Definition: 1Primary vegetation code 20 or 21
Attribute_Definition_Source: Attribute_Domain_Values:
Unrepresentable_Domain: Character Field
Attribute:
Attribute_Label: Attribute_Code
Attribute_Definition_Source: Viereck vegetative community code
Attribute_Domain_Values:
Unrepresentable_Domain: Character Field
Attribute:
Attribute_Label: Description
Attribute_Definition: Definition: Viereck description of the alder vegetation type
Attribute_Definition_Source: CMMEL automation of the 1983 vegetation map by Tande.

Attribute_Domain_Values:
Unrepresentable_Domain: Character Field
Attribute:
Attribute_Label: Alder
Attribute_Definition: A alder is the primary vegetation type
Attribute_Definition_Source: AKNHP
Attribute_Domain_Values:
Unrepresentable_Domain: Character Field
Attribute:
Attribute_Label: MOISTURE
Attribute_Definition: WET = Moisture and standing water present throughout much of the year.
Attribute_Definition_Source: AKNHP
Attribute_Domain_Values:
Unrepresentable_Domain: Character Field
Attribute:
Attribute_Label: DISTURBANCE
Attribute_Definition: D = alder encroachment is likely due to human disturbance. N = alder encroachment is not likely due to human disturbance
Attribute_Definition_Source: AKNHP
Attribute_Domain_Values:
Unrepresentable_Domain: Character Field

DISTRIBUTION_INFORMATION

Distributor:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Natural Resources Branch Elmendorf Air Force Base
Contact_Person: Kate Wedemeyer
Contact_Position: Wildlife Biologist
Contact_Address:
Address_Type: mailing and physical address
Address: 6326 Arctic Warrior Drive
City: Elmendorf Air Force Base
State_or_Province: Alaska
Postal_Code: 99506
Country: USA
Contact_Voice_Telephone:
Contact_Facsimile_Telephone:
Contact_Electronic_Mail_Address:
Hours_of_Service:
Resource_Description:
Distribution_Liability:
Although these data have been processed successfully on a computer system at AKNHP no warranty expressed or implied is made by AKNHP regarding the use of the data on any other

system, nor does the act of distribution constitute such warranty.
Standard_Order_Process:
Digital_Form:
Digital_Transfer_Information:
Format_Name:ArcView shape file
Digital_Transfer_Option:
Offline_Option:
Offline_Media:
Recording_Format: 3.2
Compatibility_Information:
ArcView GIS
Fees:
Ordering_Instructions:
Contact EAFB - Natural Resources Branch

METADATA_REFERENCE_INFORMATION

Metadata_Date: 20001220
Metadata_Review_Date: 20001220
Metadata_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Alaska Natural Heritage Program
Contact_Person: Julie Michaelson
Contact_Position: Data Manager
Contact_Address:
Address_Type: Mailing and physical address
Address: 707 A Street
City: Anchorage
State_or_Province: Alaska
Postal_Code: 99503
Country: USA
Contact_Voice_Telephone: (907)257-2781
Contact_Facsimile_Telephone:
Contact_Electronic_Mail_Address:
Hours_of_Service:
Metadata_Standard_Name: FGDC CSDGM
Metadata_Standard_Version: FGDC-STD-001-1998

Appendix 4C. Metadata for ArcView GIS (DISTUBALDER.MET).

IDENTIFICATION_INFORMATION

Citation:
 Citation_Information:
  Originator: Alaska Natural Heritage Program
  Publication_Date: 20001230
  Title: Disturbed Alder Community Types on Elmendorf Air Force Base
  Edition: 2000
  Geospatial_Data_Presentation_Form: Digital File
  Publication_Information:
   Publication_Place:
   Publisher:
  Other_Citation_Details:
  Online_Linkage:
  Larger_Work_Citation:
   Citation_Information:
    Originator: Alaska Natural Heritage Program
    Publication_Date: 20001230
    Title: Identification and characterization of disturbed alder sites Elmendorf Air Force Base, Alaska
    Publication_Information:
     Publication_Place:
     Publisher:
    Online_Linkage:
Description:
 Abstract:
  The DISTURBALDER.SHP file is a derivitive polygon feature shape file generated from the 1999ALDER.SHP file . This shape file includes all alder vegetation communities in which alder encroachment is likely due to human disturbance on Elmendorf Air Force Base. This shape file is used as a theme for the Alder Characterization project conducted by the Alaska Natural Heritage Program for the Natural Resources Branch at Elmendorf AFB in 1999.
 Purpose:
  The shape file is used to reference the location of primary alder communities present on EAFB in which alder encroachment is likely due to human activity. This derivitive product can be used by base personel to get an overview of disturbed alder sites across EAFB.

.

 Supplemental_Information:
Time_Period_of_Content:
 Time_Period_Information:
  Range_of_Dates/Times:
   Beginning_Date: 199906
   Ending_Date: 200008
 Currentness_Reference:
Status:

Progress: Complete
Maintenance_and_Update_Frequency: None planned
Spatial_Domain:
Bounding_Coordinates:
West_Bounding_Coordinate: 346032.5949
East_Bounding_Coordinate: 352223.6588
North_Bounding_Coordinate: 6801215.7900
South_Bounding_Coordinate: 6794837.1181
Keywords:
Theme:
Theme_Keyword_Thesaurus: None
Theme_Keyword: VEGETATION
Theme_Keyword:
Theme_Keyword:
Place:
Place_Keyword_Thesaurus: None
Place_Keyword: ELMENDORF AFB
Place_Keyword: ALASKA
Access_Constraints:
Approved for public release. Distribution unlimited.
Use_Constraints:
None
Point_of_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Natural Resources Branch Elmendorf AFB
Contact_Person: Ms. Kate Wedemeyer
Contact_Position: Wildlife Biologist
Contact_Address:
Address_Type: mailing and physical address
Address: 6326 Arctic Warrior Drive
City: Elmendorf Air Force Base
State_or_Province: Alaska
Postal_Code: 99506
Country: USA
Contact_Voice_Telephone:
Contact_Facsimile_Telephone:
Contact_Electronic_Mail_Address:
Hours_of_Service:
Native_Data_Set_Environment:
ArcView version 3.2 shapefile format
c:\elmendorf\alder\distalder.shp

DATA_QUALITY_INFORMATION

Attribute_Accuracy:

Attribute_Accuracy_Report:
Logical_Consistency_Report:
Completeness_Report:
The DISTURBALDER shape file is a derivitive map of all alder vegetation map (1999ALDER.SHP) classes from the digital file of the 1983 vegetation map produced by G. Tande. Disturbance was field checked by AKNHP personnel in the summers of 1999 and 2000. Indicators of disturbance were identified in the field or interpreted using color infra-red photography. Disturbance rating was assigned to each alder polygon by the program's ecologist.
Positional_Accuracy:
Horizontal_Positional_Accuracy:
Horizontal_Positional_Accuracy_Report:
Unknown
Vertical_Positional_Accuracy:
Vertical_Positional_Accuracy_Report: Unknown
Lineage:
Source_Information:
Source_Citation: Tande, G.F., S.C. Klein, and J.Michaelson. 2000. Establishment and characterization of disturbed alder sites on Elmendorf Air Force Base, Alaska. Rep. Prep. For: Natural resources Branch, 3/CES/CEVPW, 6326 Arctic Warrior Dr., Elmendorf AFB, AK. Contract No. DAMD17-99-2-9004. U.S. Army Medical Research and Material Command, Ft. Detrick, MD. 21702-5012. Alaska Natural Heritage Program, Environment and Natural resources Institute, University of Alaska Anchorage, 707 A St., Anchorage, Alaska.
Citation_Information:
Originator: Alaska Natural Heritage Program, Environment and Natural Resources Institute, University of Alaska Anchorage
Publication_Date: 20001230
Title: Identifications and characterization of disturbed alder sites on Elmendorf Air Force Base, Alaska
Edition:
Geospatial_Data_Presentation_Form: Digital Map
Publication_Information:
Publication_Place: Anchorage, Alaska
Publisher:
Other_Citation_Details:
Online_Linkage:
Larger_Work_Citation:
Citation_Information:
Originator:
Publication_Date:
Title:
Publication_Information:
Publication_Place:
Publisher:
Online_Linkage:
Source_Scale_Denominator:
Type_of_Source_Media: electronic

Source_Time_Period_of_Content:
Time_Period_Information:
Range_of_Dates/Times:
Beginning_Date: 199906
Ending_Date: 200008
Source_Currentness_Reference:
Source_Citation_Abbreviation:
Source_Contribution:
The source map is a theme of the GIS produced for the alder identification and characterization project. The basemap is from Tande 1983 edited 1999.
Process_Step:
Process_Description:
Using the alder basemap for Elmendorf Air Force Base, 1999ALDER.shp a query of all disturbance classes equal to "N" was made. From this query a new shape file labeled DISTURBALDER.SHP was produced.This shape file was added as a theme into the Alder Identification and Characterization project GIS.
Source_Used_Citation_Abbreviation:
Process_Date: 20001130
Source_Produced_Citation_Abbreviation:
Process_Contact:
Contact_Information:
Contact_Person_Primary:
Contact_Organization: Alaska Natural Heritage Program
Contact_Person: Julie Michaelson
Contact_Position: Data Manager
Contact_Address:
Address_Type: mailing and physical address
Address: 707 A Street
City: Anchorage
State_or_Province: Alaska
Postal_Code: 99503
Country: USA
Contact_Voice_Telephone: (907)257-2781
Contact_Facsimile_Telephone:
Contact_Electronic_Mail_Address: anjam1@uaa.alaska.edu
Hours_of_Service:

SPATIAL_DATA_ORGANIZATION_INFORMATION

Direct_Spatial_Reference_Method:
Point_and_Vector_Object_Information:
SDTS_Terms_Description:
SDTS_Point_and_Vector_Object_Type: Polygon
Point_and_Vector_Object_Count: 135

SPATIAL_REFERENCE_INFORMATION

Horizontal_Coordinate_System_Definition:
Planar:
Map_Projection:
Planar_Coordinate_Information:
Planar_Coordinate_Encoding_Method: Coordinate pair
Coordinate_Representation:
Abscissa_Resolution: 2.540000000000
Ordinate_Resolution: -2.54000000000
Planar_Distance_Units: meters
Geodetic_Model:
Horizontal_Datum_Name: North American Datum of 1927
Ellipsoid_Name: Clarke 1866
Semi-major_Axis: 6,378,206.4
Denominator_of_Flattening_Ratio: 294.98

ENTITY_AND_ATTRIBUTE_INFORMATION

Detailed_Description:
Entity_Type:
Entity_Type_Label: distalder.dbf
Entity_Type_Definition: Shapefile Attribute Table
Entity_Type_Definition_Source: None
Attribute:
Attribute_Label:
Attribute_Definition:
Attribute_Definition_Source:
Attribute_Domain_Values:
Unrepresentable_Domain:
Attribute:
Attribute_Label: PRIMARY
Attribute_Definition: Primary vegetation code 20 or 21
Attribute_Definition_Source: Attribute_Domain_Values:
Unrepresentable_Domain: Character Field
Attribute:
Attribute_Label: Attribute_Code
Attribute_Definition_Source: Viereck vegetative community code
Attribute_Domain_Values:
Unrepresentable_Domain: Character Field
Attribute:
Attribute_Label: Description
Attribute_Definition: Definition: Viereck description of the alder vegetation type
Attribute_Definition_Source: CMMEL automation of the 1983 vegetation map by Tande.
Attribute_Domain_Values:
Unrepresentable_Domain: Character Field
Attribute:

Attribute_Label: Alder
Attribute_Definition: A alder is the primary vegetation type
Attribute_Definition_Source: AKNHP
Attribute_Domain_Values:
Unrepresentable_Domain: Character Field
Attribute:
Attribute_Label: MOISTURE
Attribute_Definition: WET = Moisture and standing water present throughout much of the year.
Attribute_Definition_Source: AKNHP
Attribute_Domain_Values:
Unrepresentable_Domain: Character Field
Attribute:
Attribute_Label: DISTURBANCE
Attribute_Definition: d = alder encroachment is likely due to human disturbance. N = alder encroachment is not likely due to human disturbance
Attribute_Definition_Source: AKNHP
Attribute_Domain_Values:
Unrepresentable_Domain: Character Field

DISTRIBUTION_INFORMATION

Distributor:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Natural Resources Branch Elmendorf Air Force Base
Contact_Person: Kate Wedemeyer
Contact_Position: Wildlife Biologist
Contact_Address:
Address_Type: mailing and physical address
Address: 6326 Arctic Warrior Drive
City: Elmendorf Air Force Base
State_or_Province: Alaska
Postal_Code: 99506
Country: USA
Contact_Voice_Telephone:
Contact_Facsimile_Telephone:
Contact_Electronic_Mail_Address:
Hours_of_Service:
Resource_Description:
Distribution_Liability:
Although these data have been processed successfully on a computer system at AKNHP no warranty expressed or implied is made by AKNHP regarding the use of the data on any other system, nor does the act of distribution constitute such warranty.
Standard_Order_Process:
Digital_Form:

Digital_Transfer_Information:
Format_Name:ArcView shape file
Digital_Transfer_Option:
Offline_Option:
Offline_Media:
Recording_Format: 3.2
Compatibility_Information:
ArcView GIS
Fees:
Ordering_Instructions:
Contact EAFB - Natural Resources Branch

METADATA_REFERENCE_INFORMATION

Metadata_Date: 20001220
Metadata_Review_Date: 20001220
Metadata_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Alaska Natural Heritage Program
Contact_Person: Julie Michaelson
Contact_Position: Data Manager
Contact_Address:
Address_Type: Mailing and physical address
Address: 707 A Street
City: Anchorage
State_or_Province: Alaska
Postal_Code: 99503
Country: USA
Contact_Voice_Telephone: (907)257-2781
Contact_Facsimile_Telephone:
Contact_Electronic_Mail_Address:
Hours_of_Service:
Metadata_Standard_Name: FGDC CSDGM
Metadata_Standard_Version: FGDC-STD-001-1998

Appendix 4D. Metadata for ArcView GIS (ALDERPLOTS.MET).

IDENTIFICATION_INFORMATION

Citation:
 Citation_Information:
  Originator: Alaska Natural Heritage Program
  Publication_Date: 20001230
  Title: Elmendorf Air Force Base Alder Project Plot Locations
  Edition: 2000
  Geospatial_Data_Presentation_Form: Map
  Publication_Information:
   Publication_Place:
   Publisher:
  Other_Citation_Details:
  Online_Linkage:
  Larger_Work_Citation:
   Citation_Information:
    Originator: G.F. Tande; S.C Klein; J. Michaelson
    Publication_Date: 20001230
    Title: Identification and characterization of disturbed alder
     sites on Elmendorf Air Force Base, Alaska
    Publication_Information:
     Publication_Place:
     Publisher:
    Online_Linkage:
Description:
 Abstract:
  The alderplots.shp file is a point feature shape file representing the locations of 57 Alder Plots on Elmendorf Air Force Base in 1999 and 2000. Locations were placed using the edited version of the 1983 Elmendorf AFB Vegetation map. (Tande 1983). Plots were established by AKNHP vegetation ecologist and represents a base-wide sampling of alder vegetation types.
 Purpose:
  The plot shape file is used to reference the location of 57
  alder plots to which plot data can be used to understand
  the stand composition of the alder vegetation type on EAFB
  and to get a random sampling of moisture regime and
  disturbance present in alder stands.
 Supplemental_Information:
Time_Period_of_Content:
 Time_Period_Information:
  Range_of_Dates/Times:
   Beginning_Date: 199906
   Ending_Date: 200008
 Currentness_Reference:
Status:

Progress: Complete
Maintenance_and_Update_Frequency: None planned
Spatial_Domain:
Bounding_Coordinates:
West_Bounding_Coordinate: 345719.5527
East_Bounding_Coordinate: 351641.1957
North_Bounding_Coordinate: 6800857.5063
South_Bounding_Coordinate: 6794132.0704
Keywords:
Theme:
Theme_Keyword_Thesaurus: None
Theme_Keyword: VEGETATION
Theme_Keyword: ALDER
Place:
Place_Keyword_Thesaurus: None
Place_Keyword: ELMENDORF AIR FORCE BASE
Access_Constraints:
Approved for public release. Distribution unlimited.
Use_Constraints:
None
Point_of_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Natural Resources Branch Elmendorf Air Force Base
Contact_Person: Kate Wedemeyer
Contact_Position: Wildlife Biologist
Contact_Address:
Address_Type: mailing and physical address
Address: 6326 Arctic Warrior Drive
City: Elmendorf Air Force Base
State_or_Province: Alaska
Postal_Code: 99506
Country: USA
Contact_Voice_Telephone:
Contact_Facsimile_Telephone:
Contact_Electronic_Mail_Address:
Hours_of_Service:
Native_Data_Set_Environment:
ArcView version 3.2 shapefile format
c:\elmendorf\alder\alderplots.shp

DATA_QUALITY_INFORMATION

Attribute_Accuracy:
Attribute_Accuracy_Report: Unknown
Logical_Consistency_Report: Unknown

Completeness_Report:
Positional_Accuracy:
Horizontal_Positional_Accuracy:
Horizontal_Positional_Accuracy_Report: Unknown
Vertical_Positional_Accuracy:
Vertical_Positional_Accuracy_Report: Unknown
Lineage:
Source_Information:
Source_Citation:
Citation_Information:
Originator: Alaska Natural Heritage Program, ENRI/UAA for EAFB Natural Resources Branch
Publication_Date: 20001230
Title: Establishment and characterization of disturbed alder sites on Elmendorf Air Force Base, Alaska
Edition: 2000
Geospatial_Data_Presentation_Form: digital map
Publication_Information:
Publication_Place:
Publisher:
Other_Citation_Details:
Online_Linkage:
Larger_Work_Citation:
Citation_Information:
Originator:
Publication_Date:
Title:
Publication_Information:
Publication_Place:
Publisher:
Online_Linkage:
Source_Scale_Denominator:
Type_of_Source_Media:
Source_Time_Period_of_Content:
Time_Period_Information:
Range_of_Dates/Times:
Beginning_Date: 199906
Ending_Date: 200008
Source_Currentness_Reference:
Source_Citation_Abbreviation:
Source_Contribution:
Process_Step:
Process_Description: Field plot locations collected by Alaska Natural Heritage Program personnel in summer 1999-2000 were transferred from color-infrared photography to the alder base map produced for the alder characterization project from Tande1983 edited 2000. Aa point feature

theme was created from the point layer using ArcView 3.2 software. Three attributes were added to include plot_id, Disturbance, and moisture.

Source_Used_Citation_Abbreviation:
Process_Date: 200011
Source_Produced_Citation_Abbreviation:
Process_Contact:
Contact_Information:
Contact_Person_Primary: Julie Michaelson
Contact_Organization: Alaska Natural Heritage Program
Contact_Person:
Contact_Position: Data Manager
Contact_Address: 707 A Street
Address_Type: mailing and physical address
Address:
City: Anchorage
State_or_Province: AK
Postal_Code: 99501
Country: USA
Contact_Voice_Telephone: (907)257-2781
Contact_Facsimile_Telephone:
Contact_Electronic_Mail_Address: anjam1@uaa.alaska.edu
Hours_of_Service:

SPATIAL_DATA_ORGANIZATION_INFORMATION

Direct_Spatial_Reference_Method: Point
Point_and_Vector_Object_Information:
SDTS_Terms_Description:
SDTS_Point_and_Vector_Object_Type: Point
Point_and_Vector_Object_Count: 57

SPATIAL_REFERENCE_INFORMATION

Horizontal_Coordinate_System_Definition:
Planar:
Map_Projection:
Planar_Coordinate_Information:
Planar_Coordinate_Encoding_Method:
Coordinate_Representation:
Abscissa_Resolution:
Ordinate_Resolution:
Planar_Distance_Units:
Geodetic_Model:
Horizontal_Datum_Name: North American Datum of 1927
Ellipsoid_Name: Clarke 1866
Semi-major_Axis:

Denominator_of_Flattening_Ratio:

: ENTITY_AND_ATTRIBUTE_INFORMATION

Detailed_Description:
Entity_Type:
Entity_Type_Label: alderplots.dbf
Entity_Type_Definition: Shapefile Attribute Table
Entity_Type_Definition_Source: None
Attribute:
Attribute_Label:
Attribute_Definition:
Attribute_Definition_Source:
Attribute_Domain_Values:
Unrepresentable_Domain:
Attribute:
Attribute_Label: PLOT_ID
Attribute_Definition: Alder plot identification code
Attribute_Definition_Source: Attribute_Domain_Values:
Unrepresentable_Domain: Character Field
Attribute:
Attribute_Label: MOISTURE
Attribute_Definition: W = Moisture and standing water present throughout much of the year.
D = Dry
Unk = Unknown
Attribute_Definition_Source: AKNHP
Attribute_Domain_Values:
Unrepresentable_Domain: Character Field
Attribute:
Attribute_Label: DISTURBANCE
Attribute_Definition: d = alder encroachment is likely due to human disturbance. N = alder encroachment is not likely due to human disturbance
Attribute_Definition_Source: AKNHP
Attribute_Domain_Values:
Unrepresentable_Domain: Character Field

DISTRIBUTION_INFORMATION

Distributor:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Natural Resources Branch Elmendorf Air Force Base
Contact_Person: Kate Wedemeyer
Contact_Position: Wildlife Biologist
Contact_Address:
Address_Type: mailing and physical address

Address: 6326 Arctic Warrior Drive
City: Elmendorf Air Force Base
State_or_Province: Alaska
Postal_Code: 99506
Country: USA
Contact_Voice_Telephone:
Contact_Facsimile_Telephone:
Contact_Electronic_Mail_Address:
Hours_of_Service:
Resource_Description:
Distribution_Liability:
Although these data have been processed successfully on a computer system at AKNHP no warranty expressed or implied is made by AKNHP regarding the use of the data on any other system, nor does the act of distribution constitute such warranty.
Standard_Order_Process:
Digital_Form:
Digital_Transfer_Information:
Format_Name:ArcView shape file
Digital_Transfer_Option:
Offline_Option:
Offline_Media:
Recording_Format: 3.2
Compatibility_Information:
ArcView GIS
Fees:
Ordering_Instructions:
Contact EAFB - Natural Resources Branch

METADATA_REFERENCE_INFORMATION

Metadata_Date: 20001220
Metadata_Review_Date: 20001220
Metadata_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Alaska Natural Heritage Program
Contact_Person: Julie Michaelson
Contact_Position: Data Manager
Contact_Address:
Address_Type: Mailing and physical address
Address: 707 A Street
City: Anchorage
State_or_Province: Alaska
Postal_Code: 99503
Country: USA

Contact_Voice_Telephone: (907)257-2781
Contact_Facsimile_Telephone:
Contact_Electronic_Mail_Address:
Hours_of_Service:
Metadata_Standard_Name: FGDC CSDGM
Metadata_Standard_Version: FGDC-STD-001-1998

Appendix 4E. Metadata for ArcView GIS (99ALDER.MET).

IDENTIFICATION_INFORMATION

Citation:
 Citation_Information:
  Originator: Alaska Natural Heritage Program
  Publication_Date: 20001230
  Title: Alder Vegetation Community Types on Elmendorf Air Force Base
  Edition: 2000
  Geospatial_Data_Presentation_Form: Digital File
  Publication_Information:
   Publication_Place:
   Publisher:
  Other_Citation_Details:
  Online_Linkage:
  Larger_Work_Citation:
   Citation_Information:
     Originator: Alaska Natural Heritage Program,UAA for Natural Resources Branch, Elmendorf AFB
    Publication_Date: 20001230
    Title: Identification and characterization of disturbed alder sites Elmendorf Air Force Base, Alaska
    Publication_Information:
     Publication_Place:
     Publisher:
    Online_Linkage:
Description:
 Abstract:
  The 1999ALDER.SHP file is a derivitive polygon feature shape file generated from the 1983 Tande vegetation map. This shape file includes all alder vegetation communities found on Elmendorf Air Force Base. This shape file includes all primary alder types coded 20 and 21 on the 1983 vegetation map plus additional polygons known from field checking to be dominated by alder community type. This shape file is used as the basemap for the Alder Characterization project conducted by the Alaska Natural Heritage Program for the Natural Resources Branch at Elmendorf AFB in 1999. This product was used as the base map for the 1999-2000 Alder identification and characterization project for EAFB.
 Purpose:
  The shape file is used to reference the location of primary alder communities present on EAFB and to provide a baseline layer for the Alder Characterization project conducted in 1999. This layer provided the base map for the project and was used to georeference the 57 alder ground plots from which vegetative data was collected. In addition this layer help guide the field plot selection and checking effort associated with the alder project.

 Supplemental_Information:
Time_Period_of_Content:

Time_Period_Information:
  Range_of_Dates/Times:
    Beginning_Date: 199906
    Ending_Date: 200008
  Currentness_Reference:
Status:
  Progress: Complete
  Maintenance_and_Update_Frequency: None planned
Spatial_Domain:
  Bounding_Coordinates:
    West_Bounding_Coordinate: 346032.5949
    East_Bounding_Coordinate: 352223.6588
    North_Bounding_Coordinate: 6801215.7900
    South_Bounding_Coordinate: 6794837.1181
Keywords:
  Theme:
    Theme_Keyword_Thesaurus: None
    Theme_Keyword: VEGETATION
    Theme_Keyword: ALDER
    Theme_Keyword: MONITORING
  Place:
    Place_Keyword_Thesaurus: None
    Place_Keyword: ELMENDORF AFB
    Place_Keyword: ALASKA
Access_Constraints:
  Approved for public release. Distribution unlimited.
Use_Constraints:
  None
Point_of_Contact:
  Contact_Information:
    Contact_Organization_Primary:
      Contact_Organization: Natural Resources Branch Elmendorf AFB
      Contact_Person: Ms. Kate Wedemeyer
    Contact_Position: Wildlife Biologist
    Contact_Address:
      Address_Type: mailing and physical address
      Address: 6326 Arctic Warrior Drive
      City: Elmendorf Air Force Base
      State_or_Province: Alaska
      Postal_Code: 99506
      Country: USA
    Contact_Voice_Telephone:
    Contact_Facsimile_Telephone:
    Contact_Electronic_Mail_Address:
    Hours_of_Service:
Native_Data_Set_Environment:

ArcView version 3.2 shapefile format
c:\elmendorf\alder\1999alder.shp

DATA_QUALITY_INFORMATION

Attribute_Accuracy:
Attribute_Accuracy_Report:
Logical_Consistency_Report:
Completeness_Report:
The 1999ALDER shape file is a derivitive map of all alder vegetation map classes from the digital file of the 1983 vegetation map produced by G. Tande. Additional polygons were added to update the map as to the distribution of alder for EAFB.
Positional_Accuracy:
Horizontal_Positional_Accuracy:
Horizontal_Positional_Accuracy_Report:
Unknown
Vertical_Positional_Accuracy:
Vertical_Positional_Accuracy_Report: Unknown
Lineage:
Source_Information:
Source_Citation: Tande, G.F., S.C. Klein, and J.Michaelson. 2000. Establishment and characterization of disturbed alder sites on Elmendorf Air Force Base, Alaska. Rep. Prep. For: Natural resources Branch, 3/CES/CEVPW, 6326 Arctic Warrior Dr., Elmendorf AFB, AK. Contract No. DAMD17-99-2-9004. U.S. Army Medical Research and Material Command, Ft. Detrick, MD. 21702-5012. Alaska Natural Heritage Program, Environment and Natural resources Institute, University of Alaska Anchorage, 707 A St., Anchorage, Alaska.
Citation_Information:
Originator: Alaska Natural Heritage Program, Environment and Natural Resources Institute, University of Alaska Anchorage
Publication_Date: 20001230
Title: Identifications and characterization of disturbed alder sites on Elmendorf Air Force Base, Alaska
Edition:
Geospatial_Data_Presentation_Form: Digital Map
Publication_Information:
Publication_Place: Anchorage, Alaska
Publisher:
Other_Citation_Details:
Online_Linkage:
Larger_Work_Citation:
Citation_Information:
Originator:
Publication_Date:
Title:
Publication_Information:
Publication_Place:

Publisher:
Online_Linkage:
Source_Scale_Denominator:
Type_of_Source_Media: electronic
Source_Time_Period_of_Content:
Time_Period_Information:
Range_of_Dates/Times:
Beginning_Date: 199906
Ending_Date: 200008
Source_Currentness_Reference:
Source_Citation_Abbreviation:
Source_Contribution:
The sourcemap is a theme of the GIS produced for the alder identification and characterization project.
Process_Step:
Process_Description:
Map classes 20 and 21 with alder types as the primary vegetation community were extracted from the 1983 vegetation map by Tande of EAFB using ArcView 3.2 software. To this interim shape file were added polygons that in 1999-2000 now have returned to an alder vegetative community. Polygons from the original map were edited and added where ground survey had shown alder communities to exist as of 1999. This composite product was made into an ArcView shape file and used as the base map for the alder characterization project. No alteration to the original map projection was made.

Source_Used_Citation_Abbreviation:
Process_Date: 20001115
Source_Produced_Citation_Abbreviation:
Process_Contact:
Contact_Information:
Contact_Person_Primary:
Contact_Organization: Alaska Natural Heritage Program
Contact_Person: Julie Michaelson
Contact_Position: Data Manager
Contact_Address:
Address_Type: mailing and physical address
Address: 707 A Street
City: Anchorage
State_or_Province: Alaska
Postal_Code: 99503
Country: USA
Contact_Voice_Telephone: (907)257-2781
Contact_Facsimile_Telephone:
Contact_Electronic_Mail_Address: anjam1@uaa.alaska.edu
Hours_of_Service:

SPATIAL_DATA_ORGANIZATION_INFORMATION

Direct_Spatial_Reference_Method:
Point_and_Vector_Object_Information:
SDTS_Terms_Description:
SDTS_Point_and_Vector_Object_Type: Polygon
Point_and_Vector_Object_Count: 238

SPATIAL_REFERENCE_INFORMATION

Horizontal_Coordinate_System_Definition:
Planar:
Map_Projection:
Planar_Coordinate_Information:
Planar_Coordinate_Encoding_Method: Coordinate pair
Coordinate_Representation:
Abscissa_Resolution: 2.540000000000
Ordinate_Resolution: -2.54000000000
Planar_Distance_Units: meters
Geodetic_Model:
Horizontal_Datum_Name: North American Datum of 1927
Ellipsoid_Name: Clarke 1866
Semi-major_Axis: 6,378,206.4
Denominator_of_Flattening_Ratio: 294.98

ENTITY_AND_ATTRIBUTE_INFORMATION

Detailed_Description:
Entity_Type:
Entity_Type_Label: 99alder.dbf
Entity_Type_Definition: Shapefile Attribute Table
Entity_Type_Definition_Source: None
Attribute:
Attribute_Label:
Attribute_Definition:
Attribute_Definition_Source:
Attribute_Domain_Values:
Unrepresentable_Domain:
Attribute:
Attribute_Label: PRIMARY
Attribute_Definition: 1Primary vegetation code 20 or 21
Attribute_Definition_Source: Attribute_Domain_Values:
Unrepresentable_Domain: Character Field
Attribute:
Attribute_Label: Attribute_Code
Attribute_Definition_Source: Viereck vegetative community code
Attribute_Domain_Values:

Unrepresentable_Domain: Character Field
Attribute:
Attribute_Label: Description
Attribute_Definition: Definition: Viereck description of the alder vegetation type
Attribute_Definition_Source: CMMEL automation of the 1983 vegetation map by Tande.
Attribute_Domain_Values:
Unrepresentable_Domain: Character Field
Attribute:
Attribute_Label: Alder
Attribute_Definition: A alder is the primary vegetation type
Attribute_Definition_Source: AKNHP
Attribute_Domain_Values:
Unrepresentable_Domain: Character Field
Attribute:
Attribute_Label: MOISTURE
Attribute_Definition: WET = Moisture and standing water present throughout much of the year.
Attribute_Definition_Source: AKNHP
Attribute_Domain_Values:
Unrepresentable_Domain: Character Field
Attribute:
Attribute_Label: DISTURBANCE
Attribute_Definition: d = alder encroachment is likely due to human disturbance. N = alder encroachment is not likely due to human disturbance
Attribute_Definition_Source: AKNHP
Attribute_Domain_Values:
Unrepresentable_Domain: Character Field

DISTRIBUTION_INFORMATION

Distributor:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Natural Resources Branch Elmendorf Air Force Base
Contact_Person: Kate Wedemeyer
Contact_Position: Wildlife Biologist
Contact_Address:
Address_Type: mailing and physical address
Address: 6326 Arctic Warrior Drive
City: Elmendorf Air Force Base
State_or_Province: Alaska
Postal_Code: 99506
Country: USA
Contact_Voice_Telephone:
Contact_Facsimile_Telephone:
Contact_Electronic_Mail_Address:
Hours_of_Service:

Resource_Description:
Distribution_Liability:
Although these data have been processed successfully on a computer system at AKNHP no warranty expressed or implied is made by AKNHP regarding the use of the data on any other system, nor does the act of distribution constitute such warranty.
Standard_Order_Process:
Digital_Form:
Digital_Transfer_Information:
Format_Name:ArcView shape file
Digital_Transfer_Option:
Offline_Option:
Offline_Media:
Recording_Format: 3.2
Compatibility_Information:
ArcView GIS
Fees:
Ordering_Instructions:
Contact EAFB - Natural Resources Branch

METADATA_REFERENCE_INFORMATION

Metadata_Date: 20001220
Metadata_Review_Date: 20001220
Metadata_Contact:
Contact_Information:
Contact_Organization_Primary:
Contact_Organization: Alaska Natural Heritage Program
Contact_Person: Julie Michaelson
Contact_Position: Data Manager
Contact_Address:
Address_Type: Mailing and physical address
Address: 707 A Street
City: Anchorage
State_or_Province: Alaska
Postal_Code: 99503
Country: USA
Contact_Voice_Telephone: (907)257-2781
Contact_Facsimile_Telephone:
Contact_Electronic_Mail_Address:
Hours_of_Service:
Metadata_Standard_Name: FGDC CSDGM
Metadata_Standard_Version: FGDC-STD-001-1998

Packet Contents:

SYN-TAX Alder Plot Analysis to Accompany RESULTS. *In*:

Tande, G.F., K. Klein and J. Michaelson. 2001. **Identification and characterization of disturbed alder sites on Elmendorf Air Force Base, Alaska.** Rep. Prep. for: Conservation and Environmental Planning, 3 CES/CEVP, 6326 Arctic Warrior Dr., Elmendorf AFB, AK. Contract No. DAMD17-99-2-9004. U.S. Army Medical Research and Material Command, Ft. Detrick, MD. 21702-5012. Alaska Natural Heritage Program, Environment and Natural Resources Institute, University of Alaska Anchorage, 707 A St., Anchorage AK. 18 p. + Appendices.

SYN-TAX Alder Plot Analysis to Accompany RESULTS. *In*:

Tande, G.F., K. Klein and J. Michaelson. 2001. **Identification and characterization of disturbed alder sites on Elmendorf Air Force Base, Alaska.** Rep. Prep. for: Conservation and Environmental Planning, 3 CES/CEVP, 6326 Arctic Warrior Dr., Elmendorf AFB, AK. Contract No. DAMD17-99-2-9004. U.S. Army Medical Research and Material Command, Ft. Detrick, MD. 21702-5012. Alaska Natural Heritage Program, Environment and Natural Resources Institute, University of Alaska Anchorage, 707 A St., Anchorage AK. 19 p. + Appendices.

CONTENTS

(Refer to Table 1 for a list of plots of disturbed and undisturbed origin)

(Copy Table 2 Provided for Reference)

IA. ALDER 2

IB. ALDER 4

IIC. Alder, no spp. <5%

IIID. Alnus sinuata

IVE. Alder shrubs removed

Table 2. A summary of the SYN-TAX analysis of alder plots, EAFB, 2000. Alphanumeric codes refer to respective outputs provided in an Appended packet.

Data Matrices	Analysis	Results	Results – Statistical Output
I. Data matrix was created from plots in which alders were the overstory species. (56 columns or plots, 79 rows or species)	Analysis was run on the data matrix using k-means clustering and range of rows algorithms. Both methods use sum of squares to determine distance between two objects (plots). Three clusters were specified after looking at biplot and bar graphs from ordination of data.	Clusters divided out by alder species, not whether disturbed, undisturbed or not known. Thus, one cluster consisted of plots dominated by *Alnus tenuifolia*, one by *A. crispa* and one by *A. crispa* var. *sinuata*.	**IA.** Alder2 plots (matrix) **IA1.** Dendrogram with plots alder2 **IA2.** k-means nonhierarchical output **IB.** Alder4 (matrix) **IB1.** Dendrogram with plots alder4 **IB2.** ORDIN output alder4 **IB3.** Bar graph alder4 **IB4.** Range of rows output alder4
II. Data matrix was created in which all species with less than 5% cover were omitted. (56 columns or plots, 51 rows or species)	Ordination bar graph indicated two clusters should be used. Non-hierarchical analysis using k-means clustering was run with two clusters specified.	One cluster consisted of plots in which *Alnus crispa* var. *sinuata* were the dominant overstory species. The other cluster consisted of plots in which either *Alnus tenuifolia* or *Alnus crispa* were the dominant overstory species.	**IIC.** Alder shrubs, no spp. <5% plots (matrix) **IIC1.** Biplot axes 1/3 no <5 **IIC2.** Scattergram axes 1/ 2 no <5% **IIC3.** Nonhierarchical output no spp <5%
III. Data matrix of just *Alnus crispa* var. *sinuata* plots was created. (33 columns or plots, 53 rows or species)	Ordination bar graph indicated two clusters should be used. Non-hierarchical analysis using k-means clustering was run with two clusters specified.	Clusters divided into one group mostly dominated by *Calamagrostis canadensis,* and another dominated by *Gymnocarpium dryopteris* and/or *Ribes triste*	**IIID.** *A. sinuata* plots (matrix) **IIID1.** Ordination output *A. sinuata* **IIID2.** Bar graph *A. sinuata* **IIID3.** Non-hierarchical output (k-means clustering) sinuata
IV. Data matrix using just the understory species' cover values. All values from alders were removed. Also, all species with less than 5% cover were removed from the analysis. (56 columns or plots, 48 rows or species)	Ordination and bar graph indicated two clusters should be run. Non-hierarchical analysis using k-means clustering was run with two clusters specified.	It appeared that one cluster consists of plots dominated mostly by *Calamagrostis canadensis* and another with a combination of higher cover of *Echinopanax horridum, Sambucus racemosa, Gymnocarpium dryopteris* and/or *Ribes triste*	**IVE.** Alder, no alder, no spp<5% **IVE1.** Ordination no alder, no spp <5% **IVE2.** Biplot axes 1vs2, no alder <5% **IVE3.** Bar graph no alder, no spp. <5% **IVE4.** Non-hierarchical no alder, no spp <5%

IA. Data Matrix EAFB LTVM Project

	TA1	TA2	TA3	TA4	TA5	TA5A	TA6	TA7	TA8	TA9	TA10	TA11	TA12	TA13	TA14	TA15	TA16	TA17	TA18	TA19	Mald	Mald2	Mald3	Mald4	Mald5	Mald6	Mald7	Mald8	Mald9	Mald10
Achmil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0
Actrub	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Alncri	0	0	0	0	0	0	0	95	0	0	0	0	0	0	0	0	0	0	0	90	10	30	85	90	0	0	90	0	0	98
Alnsin	90	95	95	95	90	80	95	0	90	95	95	95	90	95	0	45	95	0	65	0	90	65	10	0	95	93	0	80	85	0
Alnten	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	50	0	60	0	0	0	0	0	0	0	0	0	0	2	0
Anespp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Angluc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arcuva	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Athfel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Betpap	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Betpapsa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Bosros	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Calcan	25	25	5	35	25	10	25	40	30	2	15	15	10	35	60	35	20	65	0	0	1	10	10	30	10	15	8	15	30	5
Carex sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carsp1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0
Cirmac	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0
Corcan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Drydil	0	0	3	2	0	15	1	1	0	1	0	0	3	5	1	10	10	1	5	0	0	2	0	10	5	0	20	0	0	15
Echhor	0	0	3	3	5	0	10	3	5	0	2	5	2	0	0	0	0	0	0	55	10	35	5	2	10	10	50	0	0	50
Empnig	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epiang	0	0	0	0	0	0	0	0	0	0	0	3	0	0	2	2	0	3	0	0	0	0	1	0	0	0	0	0	1	0
Equarv	5	5	1	3	0	5	0	5	4	5	0	2	0	5	0	5	5	0	0	0	0	0	0	0	0	13	1	1	0	2
Equflu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	1	15	0	0	0	0	0	0	0	0	0	0	0	0
Equsil	0	0	1	0	0	0	0	0	2	10	0	0	40	0	0	0	0	0	0	10	0	0	0	8	5	0	5	0	0	0
Galbor	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	5	10	0	2	2	2	1	0	1
Galtri	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Galtrif	0	0	0	1	2	0	5	5	1	2	0	0	3	0	1	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0
Geumac	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Gymdry	20	30	2	5	0	20	2	0	10	0	0	3	15	45	1	10	20	0	5	10	0	40	0	10	0	0	0	0	0	10
Herlan	0	0	0	0	0	0	0	0	0	1	0	0	0	0	5	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0
Ledgro	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Linbor	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lycann	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	2
Mentri	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Moelat	0	0	1	2	0	0	0	1	0	10	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Osmdep	0	0	0	1	2	0	5	10	0	0	5	5	0	0	0	0	0	0	0	0	10	1	2	0	5	0	0	0	0	0
Parpal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Picgla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Picglasa	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plaspp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Popbal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Poptre	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Potpal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pyrspp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ribbra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0
Ribhud	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	2	5	0	0	0	0
Ribtri	15	10	5	5	2	20	15	15	10	2	0	0	5	10	0	0	0	0	10	10	0	0	10	0	0	0	0	0	0	15
Rosaci	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
Rubida	2	3	0	2	1	0	0	1	3	3	2	5	1	2	0	1	0	0	0	5	0	3	0	0	0	1	0	30	0	0
Rubspp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Salbeb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0
Salspp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Samrac	15	15	10	5	2	35	20	5	10	5	2	5	5	5	0	1	0	0	35	0	20	0	2	15	15	0	10	0	0	0
Sansti	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Spibea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stespp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

IA. Data Matrix EAFB LTVM Project

	TA1	TA2	TA3	TA4	TA5	TA5A	TA6	TA7	TA8	TA9	TA10	TA11	TA12	TA13	TA14	TA15	TA16	TA17	TA18	TA19	Mald	Mald2	Mald3	Mald4	Mald5	Mald6	Mald7	Mald8	Mald9	Mald10
Stramp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Taroff	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Thaspa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trieur	10	10	2	2	0	0	3	2	5	0	0	0	3	2	2	2	0	1	0	0	0	0	0	0	0	1	0	0	1	0
Trifspp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Unkgra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urtgra	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vacvit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vibedu	5	5	0	1	0	10	0	1	0	0	0	0	2	10	0	0	0	0	0	0	0	10	0	0	0	2	5	1	0	0
Violan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Viospp	0	0	0	0	0	0	0	1	0	0	0	0	0	0	15	25	10	20	0	0	0	0	0	0	0	0	0	0	0	0
Cerpup	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Drespp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Eurpul	3	5	5	5	5	1	5	5	5	5	3	5	10	5	0	2	5	0	0	10	1	1	1	1	1	0	0	0	0	0
Liverwort	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0
Mnium spp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	5	0	10	0	0	0	0	0	0	0	0	0	0	0	0
Parmelia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plesch	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3	0	0	0	0	20	0
Polacu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poljun	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polssp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Sphspp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unkmoss	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	192	204	133	167	136	197	187	190	175	143	124	143	192	219	179	203	181	188	120	193	163	202	136	179	150	143	192	131	160	202

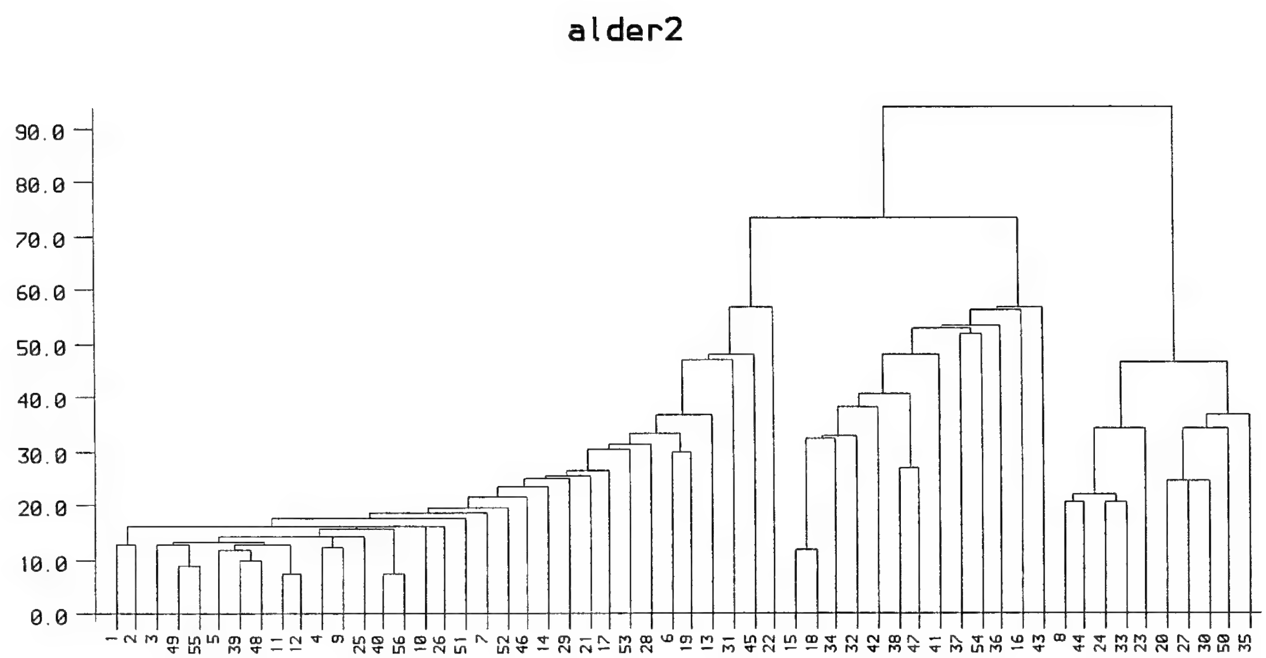
IA. Data Matrix EAFB LTVM Project

	Mald11	Mald12	Mald13	Mald14	Mald15	Mald16	Mald17	Mald18	Mald19	Mald20	Mald21	SK1	SK2	SK3	SK4	SK5	SK6	SK7	SK8	SK9	SK10	SK11	SK12	SK13	SK14	SK15		
Achmil	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0		9
Actrub	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0		5
Alncri	0	0	96	0	95	0	0	0	0	0	0	0	0	95	0	0	0	0	0	90	0	0	0	0	0	0		964
Alnsin	98	0	0	0	0	0	0	0	96	97	5	0	0	0	95	90	0	95	95	0	95	95	95	0	95	95		3069
Alnten	0	70	0	55	0	40	45	90	0	0	90	50	75	0	0	0	90	0	0	0	0	0	0	60	0	0		832
Anespp	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		2
Angluc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0		3
Arcuva	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		1
Athfel	0	0	1	0	5	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2	0	0		9
Betpap	0	0	0	0	0	2	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		14
Betpapsa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		1
Bosros	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0		2
Calcan	20	85	35	80	10	0	1	60	25	45	10	90	80	40	3	2	35	25	2	10	40	40	5	5	5	50		1414
Carex sp.	0	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		30
Carsp1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		3
Cirmac	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		5
Corcan	0	1	0	1	0	35	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0		46
Drydil	0	0	2	5	0	0	1	0	0	0	0	3	0	0	50	0	0	0	0	1	0	0	0	0	0	0		172
Echhor	60	0	0	0	35	0	0	0	0	0	0	1	0	4	5	20	0	0	0	80	15	0	2	0	0	0		487
Empnig	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		2
Epiang	0	0	0	0	0	10	0	0	5	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0		30
Equarv	10	10	1	0	5	0	2	10	3	0	50	10	4	0	0	0	10	10	0	0	0	0	2	1	2	2		199
Equflu	0	5	0	5	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		41
Equsil	0	0	10	0	1	0	0	0	0	0	0	0	0	0	2	0	7	0	0	0	0	0	0	1	0	0		102
Galbor	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		47
Galtri	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		5
Galtrif	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	3	5	0	3	15	2	1	0	1		57
Geumac	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		11
Gymdry	5	2	5	0	2	0	0	0	0	0	0	2	2	0	1	5	0	0	0	0	0	0	43	2	0	0		327
Herlan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0		19
Ledgro	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		5
Linbor	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		6
Lycann	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		5
Mentri	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		10
Moelat	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	1	0	0	0	0	0	2	0		23
Osmdep	0	0	0	0	0	0	0	1	0	2	0	0	0	2	0	0	1	0	0	0	2	12	1	0	0	0		67
Parpal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		1
Picgla	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		3
Picglasa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		1
Plaspp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		1
Popbal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		2
Poptre	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		2
Potpal	0	0	0	2	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		7
Pyrspp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0		1
Ribbra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		5
Ribhud	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		17
Ribtri	5	5	3	0	10	0	0	0	0	0	0	0	1	20	3	7	1	0	0	0	10	0	20	1	1	0		246
Rosaci	3	2	0	12	0	1	0	1	0	0	0	3	2	0	0	0	0	0	0	0	0	0	0	6	0	1		33
Rubida	0	0	2	5	1	0	0	0	0	0	0	2	5	0	0	0	1	1	0	0	0	0	0	4	4	3		93
Rubspp	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		3
Salbeb	0	0	0	0	0	15	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		23
Salspp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		1
Samrac	0	0	4	0	30	0	0	2	0	0	0	0	0	1	10	0	0	1	2	5	5	5	5	0	0	1		308
Sansti	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		4
Spibea	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		1
Stespp	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		4

IA. Data Matrix EAFB LTVM Project

	Mald11	Mald12	Mald13	Mald14	Mald15	Mald16	Mald17	Mald18	Mald19	Mald20	Mald21	SK1	SK2	SK3	SK4	SK5	SK6	SK7	SK8	SK9	SK10	SK11	SK12	SK13	SK14	SK15		
Stramp	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0		5
Taroff	0	0	0	0	0	0	0	0	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		8
Thaspa	0	2	0	0	0	0	0	0	0	0	0	3	5	0	0	0	0	0	0	0	0	0	0	1	0	0		11
Trieur	1	0	1	0	1	0	0	0	0	0	0	0	2	1	1	0	0	0	0	0	1	0	1	0	1	0		56
Trifspp.	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		2
Unkgra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0		1
Urtgra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		1
Vacvit	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		10
Vibedu	10	0	0	2	2	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0		68
Violan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		2
Viospp	0	10	0	0	4	0	1	1	0	0	0	0	20	0	0	0	1	0	0	0	2	0	0	29	0	0		139
Cerpup	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		1
Drespp	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0		11
Eurpul	0	0	1	0	10	0	0	0	0	0	0	0	0	0	0	2	1	0	1	0	0	0	0	0	0	0		104
Liverwort	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		10
Mnium spp	0	2	0	0	0	0	2	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0		34
Parmelia	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		3
Plesch	0	5	0	1	0	2	0	0	0	1	0	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0		63
Polacu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0		1
Poljun	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		2
Polssp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		1
Sphspp	0	20	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		40
Unkmoss	0	0	0	0	0	0	0	0	0	0	0	10	50	15	10	0	0	0	0	0	0	0	0	0	1	0		86
	214	225	164	168	213	135	137	171	131	149	157	220	248	180	184	126	148	136	106	186	178	168	177	122	118	154	9439	9439

IA1. Dendrogram with plots - alder2



IA2. K-means non-heirarchical output - alder2

SYNTAX_IA2 (used Run 3, p. 5)

K-MEANS CLUSTERING
alder2
INPUT AND RUN PARAMETERS
NUMBER OF VARIABLES = 79
NUMBER OF OBJECTS = 56
NUMBER OF CLUSTERS = 3
INITIAL PARTITION =RANDOM
FORMAT OF INPUT PARTITION=
NUMBER OF RUNS (SEARCHES)= 5
LABELS FOR OBJECTS =NOT USED
RUN 1
INITIAL PARTITION GENERATED AT RANDOM
INITIAL PARTITION
CLUSTER 1
3 4 6 9 11 12 14 16 17 23
25 27 28 29 30 32 33 39 40 42
45 48 49 54
CLUSTER 2
1 2 5 10 13 19 20 26 38 43
47 50 52 53 55 56
CLUSTER 3
7 8 15 18 21 22 24 31 34 35
36 37 41 44 46 51

STEP	OBJECT	FROM CLUSTER	TO CLUSTER	SSQ
0				0.29275E+06
1	50	2	3	0.28613E+06
2	20	2	3	0.27711E+06
3	30	1	3	0.26977E+06
4	27	1	3	0.26105E+06
5	33	1	3	0.25231E+06
6	23	1	3	0.24344E+06
7	7	3	1	0.23651E+06
8	51	3	1	0.22880E+06
9	46	3	1	0.22131E+06
10	31	3	1	0.21275E+06
11	21	3	1	0.20381E+06
12	32	1	3	0.19861E+06
13	42	1	3	0.19195E+06
14	54	1	3	0.18511E+06
15	38	2	3	0.17997E+06
16	43	2	3	0.17228E+06
17	47	2	3	0.16226E+06
18	22	3	2	0.15787E+06
19	16	1	3	0.15685E+06
20	14	1	2	0.15620E+06
21	6	1	2	0.15566E+06
22	56	2	1	0.15511E+06
23	52	2	1	0.15438E+06
24	5	2	1	0.15377E+06
25	26	2	1	0.15313E+06
26	55	2	1	0.15248E+06

27	10	2	1	0.15182E+06
28	13	2	1	0.15179E+06

GROUP MEMBERSHIP VECTOR FOR FINAL PARTITION

2 2 1 1 1 2 1 3 1 1 1 1 1 2 3 3 1 3 2 3
1 2 3 3 1 1 3 1 1 3 1 3 3 3 3 3 3 3 1 1
3 3 3 3 1 1 3 1 1 3 1 1 2 3 1 1

FINAL CLUSTERS:

CLUSTER 1

3 4 5 7 9 10 11 12 13 17
21 25 26 28 29 31 39 40 45 46
48 49 51 52 55 56

CLUSTER 2

1 2 6 14 19 22 53

CLUSTER 3

8 15 16 18 20 23 24 27 30 32
33 34 35 36 37 38 41 42 43 44
47 50 54

RUN 2

INITIAL PARTITION GENERATED AT RANDOM

INITIAL PARTITION

CLUSTER 1

1 6 7 10 13 16 17 18 20 30
31 32 34 35 36 37 43 47 48 51
53 54

CLUSTER 2

2 3 5 8 9 11 15 19 23 26
33 38 39 41 42 46 55

CLUSTER 3

4 12 14 21 22 24 25 27 28 29
40 44 45 49 50 52 56

STEP	OBJECT	FROM CLUSTER	TO CLUSTER	SSQ
0				0.29207E+06
1	31	1	3	0.28911E+06
2	38	2	1	0.28581E+06
3	41	2	1	0.28121E+06
4	42	2	1	0.27606E+06
5	15	2	1	0.26931E+06
6	10	1	2	0.26453E+06
7	53	1	2	0.25919E+06
8	13	1	2	0.25367E+06
9	17	1	2	0.24764E+06
10	7	1	2	0.24096E+06
11	48	1	2	0.23357E+06
12	1	1	2	0.22554E+06
13	51	1	2	0.21676E+06
14	6	1	2	0.20718E+06
15	8	2	1	0.20130E+06
16	33	2	1	0.19326E+06
17	23	2	1	0.18623E+06
18	44	3	1	0.18069E+06
19	24	3	1	0.17407E+06
20	27	3	1	0.16674E+06
21	50	3	1	0.15649E+06
22	51	2	3	0.15611E+06
23	45	3	2	0.15572E+06
24	49	3	2	0.15531E+06

25	21	3	2	0.15482E+06
26	25	3	2	0.15434E+06
27	12	3	2	0.15406E+06
28	28	3	2	0.15374E+06
29	22	3	2	0.15356E+06
30	9	2	3	0.15341E+06
31	39	2	3	0.15325E+06
32	48	2	3	0.15301E+06
33	5	2	3	0.15276E+06
34	31	3	2	0.15265E+06
35	7	2	3	0.15261E+06
36	1	2	3	0.15255E+06
37	2	2	3	0.15233E+06
38	17	2	3	0.15224E+06

GROUP MEMBERSHIP VECTOR FOR FINAL PARTITION

3 3 2 3 3 2 3 1 3 2 2 2 2 3 1 1 3 1 2 1
2 2 1 1 2 2 1 2 3 1 2 1 1 1 1 1 1 1 3 3
1 1 1 1 2 2 1 3 2 1 3 3 2 1 2 3

FINAL CLUSTERS:

CLUSTER 1

8 15 16 18 20 23 24 27 30 32
33 34 35 36 37 38 41 42 43 44
47 50 54

CLUSTER 2

3 6 10 11 12 13 19 21 22 25
26 28 31 45 46 49 53 55

CLUSTER 3

1 2 4 5 7 9 14 17 29 39
40 48 51 52 56

RUN 3

INITIAL PARTITION GENERATED AT RANDOM

INITIAL PARTITION

CLUSTER 1

1 4 5 7 9 11 12 18 21 26
29 33 34 37 38 42 43 45 46 47
48 49 51 53 54

CLUSTER 2

6 8 13 20 22 23 24 27 28 30
31 36 39 41 52

CLUSTER 3

2 3 10 14 15 16 17 19 25 32
35 40 44 50 55 56

STEP	OBJECT	FROM CLUSTER	TO CLUSTER	SSQ
0				0.28628E+06
1	33	1	2	0.27871E+06
2	50	3	2	0.27077E+06
3	35	3	2	0.26148E+06
4	44	3	2	0.25171E+06
5	52	2	3	0.24458E+06
6	39	2	3	0.23677E+06
7	13	2	3	0.22909E+06
8	28	2	3	0.22117E+06
9	31	2	3	0.21230E+06
10	6	2	3	0.20208E+06
11	41	2	1	0.19637E+06
12	32	3	1	0.19044E+06

13	15	3	1	0.18363E+06
14	36	2	1	0.17820E+06
15	22	2	3	0.17286E+06
16	16	3	1	0.16877E+06
17	53	1	3	0.16494E+06
18	45	1	3	0.16130E+06
19	49	1	3	0.15761E+06
20	21	1	3	0.15369E+06
21	46	1	3	0.14949E+06
22	12	1	3	0.14510E+06
23	11	1	3	0.14038E+06
24	7	1	3	0.13532E+06
25	26	1	3	0.12989E+06
26	48	1	3	0.12420E+06
27	1	1	3	0.11792E+06
28	4	1	3	0.11108E+06
29	51	1	3	0.10351E+06
30	9	1	3	0.94954E+05
31	5	1	3	0.85180E+05
32	29	1	3	0.75567E+05

GROUP MEMBERSHIP VECTOR FOR FINAL PARTITION

3 3 3 3 3 3 3 2 3 3 3 3 3 3 1 1 3 1 3 2
3 3 2 2 3 3 2 3 3 2 3 1 2 1 2 1 1 1 3 3
1 1 1 2 3 3 1 3 3 2 3 3 3 1 3 3

FINAL CLUSTERS:

CLUSTER 1

15 16 18 32 34 36 37 38 41 42
43 47 54

CLUSTER 2

8 20 23 24 27 30 33 35 44 50

CLUSTER 3

1 2 3 4 5 6 7 9 10 11
12 13 14 17 19 21 22 25 26 28
29 31 39 40 45 46 48 49 51 52
53 55 56

RUN 4

INITIAL PARTITION GENERATED AT RANDOM

INITIAL PARTITION

CLUSTER 1

8 11 14 18 23 30 32 34 35 37
38 39 42 48 49 50

CLUSTER 2

4 5 6 10 12 16 19 25 29 33
40 44 46 47 51 55 56

CLUSTER 3

1 2 3 7 9 13 15 17 20 21
22 24 26 27 28 31 36 41 43 45
52 53 54

STEP	OBJECT	FROM CLUSTER	TO CLUSTER	SSQ
0				0.28371E+06
1	44	2	1	0.27601E+06
2	33	2	1	0.26609E+06
3	47	2	1	0.25847E+06
4	49	1	2	0.25070E+06
5	11	1	2	0.24241E+06
6	39	1	2	0.23329E+06

7	48	1	2	0.22310E+06
8	14	1	2	0.21176E+06
9	24	3	1	0.20464E+06
10	27	3	1	0.19664E+06
11	20	3	1	0.18708E+06
12	43	3	1	0.18164E+06
13	15	3	1	0.17591E+06
14	41	3	1	0.17023E+06
15	54	3	1	0.16375E+06
16	36	3	1	0.15728E+06
17	16	2	1	0.15641E+06
18	14	2	3	0.15579E+06
19	6	2	3	0.15511E+06
20	52	3	2	0.15445E+06
21	19	2	3	0.15378E+06
22	28	3	2	0.15338E+06
23	26	3	2	0.15296E+06
24	31	3	2	0.15273E+06
25	7	3	2	0.15259E+06
26	9	3	2	0.15238E+06
27	3	3	2	0.15219E+06
28	21	3	2	0.15198E+06
29	45	3	2	0.15193E+06
30	17	3	2	0.15182E+06
31	13	3	2	0.15179E+06

GROUP MEMBERSHIP VECTOR FOR FINAL PARTITION

3 3 2 2 2 3 2 1 2 2 2 2 2 3 1 1 2 1 3 1
2 3 1 1 2 2 1 2 2 1 2 1 1 1 1 1 1 1 2 2
1 1 1 1 2 2 1 2 2 1 2 2 3 1 2 2

FINAL CLUSTERS:

CLUSTER 1

8 15 16 18 20 23 24 27 30 32
33 34 35 36 37 38 41 42 43 44
47 50 54

CLUSTER 2

3 4 5 7 9 10 11 12 13 17
21 25 26 28 29 31 39 40 45 46
48 49 51 52 55 56

CLUSTER 3

1 2 6 14 19 22 53

RUN 5

INITIAL PARTITION GENERATED AT RANDOM

INITIAL PARTITION

CLUSTER 1

1 4 5 6 7 8 11 19 20 21
22 23 26 31 33 34 35 36 43 45
47 52 54 55

CLUSTER 2

2 10 14 24 28 29 37 39 40 41
42 44 48 49 56

CLUSTER 3

3 9 12 13 15 16 17 18 25 27
30 32 38 46 50 51 53

STEP	OBJECT	FROM CLUSTER	TO CLUSTER	SSQ
0				0.30198E+06
1	44	2	1	0.29843E+06

2	24	2	1	0.29268E+06
3	41	2	3	0.28910E+06
4	42	2	3	0.28390E+06
5	37	2	3	0.27736E+06
6	53	3	2	0.27318E+06
7	3	3	2	0.26883E+06
8	17	3	2	0.26402E+06
9	12	3	2	0.25869E+06
10	25	3	2	0.25269E+06
11	13	3	2	0.24597E+06
12	46	3	2	0.23863E+06
13	9	3	2	0.23058E+06
14	51	3	2	0.22099E+06
15	43	1	3	0.21313E+06
16	47	1	3	0.20501E+06
17	34	1	3	0.19694E+06
18	54	1	3	0.19107E+06
19	36	1	3	0.18680E+06
20	30	3	1	0.18293E+06
21	50	3	1	0.17677E+06
22	27	3	1	0.16805E+06
23	52	1	2	0.16394E+06
24	4	1	2	0.15955E+06
25	11	1	2	0.15491E+06
26	55	1	2	0.14978E+06
27	26	1	2	0.14455E+06
28	7	1	2	0.13879E+06
29	5	1	2	0.13235E+06
30	1	1	2	0.12517E+06
31	45	1	2	0.11718E+06
32	31	1	2	0.10910E+06
33	6	1	2	0.10047E+06
34	21	1	2	0.90475E+05
35	19	1	2	0.80646E+05
36	22	1	2	0.75567E+05

GROUP MEMBERSHIP VECTOR FOR FINAL PARTITION

```
 2 2 2 2 2   2 2 1 2 2   2 2 2 2 3   3 2 3 2 1
 2 2 1 1 2   2 1 2 2 1   2 3 1 3 1   3 3 3 2 2
 3 3 3 1 2   2 3 2 2 1   2 2 2 3 2   2
```

FINAL CLUSTERS:

CLUSTER 1

8 20 23 24 27 30 33 35 44 50

CLUSTER 2

1 2 3 4 5 6 7 9 10 11
12 13 14 17 19 21 22 25 26 28
29 31 39 40 45 46 48 49 51 52
53 55 56

CLUSTER 3

15 16 18 32 34 36 37 38 41 42
43 47 54

IB. Data Matrix EAFB LTVM Project

	TA1	TA2	TA3	TA4	TA5	TA5A	TA6	TA7	TA8	TA9	TA10	TA11	TA12	TA13	TA14	TA15	TA16	TA17	TA18	TA19	Mald	Mald2	Mald3	Mald4	Mald5	Mald6	Mald7	Mald8	Mald9	Mald10
Achmil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0
Actrub	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Alncri	0	0	0	0	0	0	0	95	0	0	0	0	0	0	0	0	0	0	0	90	10	30	85	90	0	0	90	0	0	98
Alnsin	90	95	95	95	90	80	95	0	90	95	95	95	90	95	0	45	95	0	65	0	90	65	10	0	95	93	0	80	85	0
Alnten	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	50	0	60	0	0	0	0	0	0	0	0	0	0	2	0
Anespp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Angluc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Arcuva	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Athfel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Betpap	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Betpapsa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Bosros	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Calcan	25	25	5	35	25	10	25	40	30	2	15	15	10	35	60	35	20	65	0	0	1	10	10	30	10	15	8	15	30	5
Carex sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carsp1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0
Cirmac	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0
Corcan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Drydil	0	0	3	2	0	15	1	1	0	1	0	0	3	5	1	10	10	1	5	0	0	2	0	10	5	0	20	0	0	15
Echhor	0	0	3	3	5	0	10	3	5	0	2	5	2	0	0	0	0	0	0	55	10	35	5	2	10	10	50	0	0	50
Empnig	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epiang	0	0	0	0	0	0	0	0	0	0	0	3	0	0	2	2	0	3	0	0	0	0	1	0	0	0	0	0	1	0
Equarv	5	5	1	3	0	5	0	5	4	5	0	2	0	5	0	5	5	0	0	0	0	0	0	0	0	13	1	1	0	2
Equflu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	1	15	0	0	0	0	0	0	0	0	0	0	0	0
Equsil	0	0	1	0	0	0	0	0	2	10	0	0	40	0	0	0	0	0	0	10	0	0	0	8	5	0	5	0	0	0
Galbor	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	5	10	0	2	2	2	1	0	1
Galtri	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Galtrif	0	0	0	1	2	0	5	5	1	2	0	0	3	0	1	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0
Geumac	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Gymdry	20	30	2	5	0	20	2	0	10	0	0	3	15	45	1	10	20	0	5	10	0	40	0	10	0	0	0	0	0	10
Herlan	0	0	0	0	0	0	0	0	0	1	0	0	0	0	5	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0
Ledgro	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Linbor	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lycann	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	2
Mentri	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Moelat	0	0	1	2	0	0	0	1	0	10	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Osmdep	0	0	0	1	2	0	5	10	0	0	5	5	0	0	0	0	0	0	0	0	10	1	2	0	5	0	0	0	0	0
Parpal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Picgla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Picglasa	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plaspp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Popbal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Poptre	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Potpal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pyrspp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ribbra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0
Ribhud	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	2	5	0	0	0	0
Ribtri	15	10	5	5	2	20	15	15	10	2	0	0	5	10	0	0	0	0	10	10	0	0	10	0	0	0	0	0	0	15
Rosaci	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
Rubida	2	3	0	2	1	0	0	1	3	3	2	5	1	2	0	1	0	0	0	5	0	3	0	0	0	1	0	30	0	0
Rubspp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Salbeb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0
Salspp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Samrac	15	15	10	5	2	35	20	5	10	5	2	5	5	5	0	1	0	0	35	0	20	0	2	15	15	0	10	0	0	0
Sansti	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Spibea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stespp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

IB. Data Matrix EAFB LTVM Project

	TA1	TA2	TA3	TA4	TA5	TA5A	TA6	TA7	TA8	TA9	TA10	TA11	TA12	TA13	TA14	TA15	TA16	TA17	TA18	TA19	Mald	Mald2	Mald3	Mald4	Mald5	Mald6	Mald7	Mald8	Mald9	Mald10
Stramp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Taroff	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Thaspa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trieur	10	10	2	2	0	0	3	2	5	0	0	0	3	2	2	2	0	1	0	0	0	0	0	0	0	1	0	0	1	0
Trifspp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Unkgra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Urtgra	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vacvit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vibedu	5	5	0	1	0	10	0	1	0	0	0	0	2	10	0	0	0	0	0	0	0	10	0	0	0	2	5	1	0	0
Violan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Viospp	0	0	0	0	0	0	0	1	0	0	0	0	0	0	15	25	10	20	0	0	0	0	0	0	0	0	0	0	0	0
Cerpup	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Drespp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Eurpul	3	5	5	5	5	1	5	5	5	5	3	5	10	5	0	2	5	0	0	10	1	1	1	1	1	0	0	0	0	0
Liverwort	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0
Mnium spp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	5	0	10	0	0	0	0	0	0	0	0	0	0	0	0
Parmelia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plesch	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3	0	0	0	0	20	0
Polacu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poljun	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polssp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Sphspp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unkmoss	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	192	204	133	167	136	197	187	190	175	143	124	143	192	219	179	203	181	188	120	193	163	202	136	179	150	143	192	131	160	202

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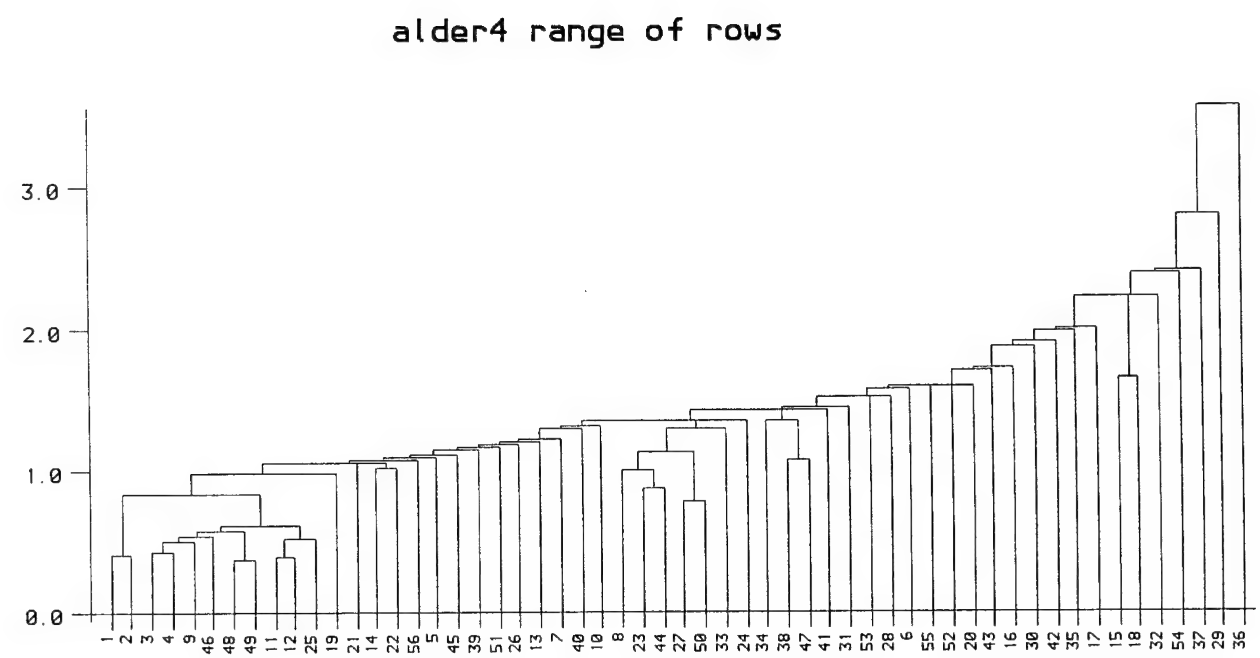
	Mald11	Mald12	Mald13	Mald14	Mald15	Mald16	Mald17	Mald18	Mald19	Mald20	Mald21	SK1	SK2	SK3	SK4	SK5	SK6	SK7	SK8	SK9	SK10	SK11	SK12	SK13	SK14	SK15		
Achmil	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0		9
Actrub	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0		5
Alncri	0	0	96	0	95	0	0	0	0	0	0	0	0	95	0	0	0	0	0	90	0	0	0	0	0	0		964
Alnsin	98	0	0	0	0	0	0	0	96	97	5	0	0	0	95	90	0	95	95	0	95	95	95	0	95	95		3069
Alnten	0	70	0	55	0	40	45	90	0	0	90	50	75	0	0	0	90	0	0	0	0	0	0	60	0	0		832
Anespp	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		2
Angluc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0		3
Arcuva	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		1
Athfel	0	0	1	0	5	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2	0	0		9
Betpap	0	0	0	0	0	2	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		14
Betpapsa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		1
Bosros	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0		2
Calcan	20	85	35	80	10	0	1	60	25	45	10	90	80	40	3	2	35	25	2	10	40	40	5	5	5	50		1414
Carex sp.	0	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		30
Carsp1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		3
Cirmac	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		5
Corcan	0	1	0	1	0	35	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0		46
Drydil	0	0	2	5	0	0	1	0	0	0	0	3	0	0	50	0	0	0	0	1	0	0	0	0	0	0		172
Echhor	60	0	0	0	35	0	0	0	0	0	0	1	0	4	5	20	0	0	0	80	15	0	2	0	0	0		487
Empnig	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		2
Epiang	0	0	0	0	0	10	0	0	5	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0		30
Equarv	10	10	1	0	5	0	2	10	3	0	50	10	4	0	0	0	10	10	0	0	0	0	2	1	2	2		199
Equflu	0	5	0	5	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		41
Equsil	0	0	10	0	1	0	0	0	0	0	0	0	0	0	2	0	7	0	0	0	0	0	0	1	0	0		102
Galbor	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		47
Galtri	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		5
Galtrif	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	3	5	0	3	15	2	1	0	1		57
Geumac	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		11
Gymdry	5	2	5	0	2	0	0	0	0	0	0	2	2	0	1	5	0	0	0	0	0	0	43	2	0	0		327
Herlan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0		19
Ledgro	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		5
Linbor	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		6
Lycann	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		5
Mentri	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		10
Moelat	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	1	0	0	0	0	0	2	0		23
Osmdep	0	0	0	0	0	0	0	1	0	2	0	0	0	2	0	0	1	0	0	0	2	12	1	0	0	0		67
Parpal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		1
Picgla	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		3
Picglasa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		1
Plaspp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		1
Popbal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		2
Poptre	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		2
Potpal	0	0	0	2	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		7
Pyrspp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0		1
Ribbra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		5
Ribhud	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		17
Ribtri	5	5	3	0	10	0	0	0	0	0	0	0	1	20	3	7	1	0	0	0	10	0	20	1	1	0		246
Rosaci	3	2	0	12	0	1	0	1	0	0	0	3	2	0	0	0	0	0	0	0	0	0	0	6	0	1		33
Rubida	0	0	2	5	1	0	0	0	0	0	0	2	5	0	0	0	1	1	0	0	0	0	0	4	4	3		93
Rubspp	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		3
Salbeb	0	0	0	0	0	15	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		23
Salspp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		1
Samrac	0	0	4	0	30	0	0	2	0	0	0	0	0	1	10	0	0	1	2	5	5	5	5	0	0	1		308
Sansti	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		4
Spibea	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		1
Stespp	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1		4

IB. Data Matrix EAFB LTVM Project

	Mald11	Mald12	Mald13	Mald14	Mald15	Mald16	Mald17	Mald18	Mald19	Mald20	Mald21	SK1	SK2	SK3	SK4	SK5	SK6	SK7	SK8	SK9	SK10	SK11	SK12	SK13	SK14	SK15		
Stramp	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0		5
Taroff	0	0	0	0	0	0	0	0	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		8
Thaspa	0	2	0	0	0	0	0	0	0	0	0	3	5	0	0	0	0	0	0	0	0	0	0	1	0	0		11
Trieur	1	0	1	0	1	0	0	0	0	0	0	0	2	1	1	0	0	0	0	0	1	0	1	0	1	0		56
Trifspp.	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		2
Unkgra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0		1
Urtgra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		1
Vacvit	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		10
Vibedu	10	0	0	2	2	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0		68
Violan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		2
Viospp	0	10	0	0	4	0	1	1	0	0	0	0	20	0	0	0	1	0	0	0	2	0	0	29	0	0		139
Cerpup	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		1
Drespp	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0		11
Eurpul	0	0	1	0	10	0	0	0	0	0	0	0	0	0	0	2	1	0	1	0	0	0	0	0	0	0		104
Liverwort	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		10
Mnium spp	0	2	0	0	0	0	2	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0		34
Parmelia	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		3
Plesch	0	5	0	1	0	2	0	0	0	1	0	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0		63
Polacu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0		1
Poljun	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		2
Polssp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		1
Sphspp	0	20	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		40
Unkmoss	0	0	0	0	0	0	0	0	0	0	0	10	50	15	10	0	0	0	0	0	0	0	0	0	1	0		86
	214	225	164	168	213	135	137	171	131	149	157	220	248	180	184	126	148	136	106	186	178	168	177	122	118	154	9439	9439

IB1. Dendrogram with plots - alder4



IB2. ORDIN ouput - alder4

SYN-TAX – IB2

PRINCIPAL COMPONENT ANALYSIS
alder3 range of rows
NUMBER OF OBJECTS - ROWS = 79
NUMBER OF VARIABLES - COLS = 56
NO. OF AXES RETAINED = 2
TYPE OF ANALYSIS = CORRELATION
PRINTOUT = SHORT
LABELS FOR OBJECTS = NOT USED
LABELS FOR VARIABLES = NOT USED
OBJECT SCORES = NOT SAVED
VARIABLE SCORES = NOT SAVED
EIGENVALUES = NOT SAVED
RESEMBLANCE MATRIX = NOT SAVED
BIPLOT = EUCLIDEAN
VARIABLES STATISTICS
POOLED VARIANCE = 2.2064

VARIABLE	MEAN	STANDARD DEVIATION	VARIANCE	VARIANCE AS %
1	0.0618	0.1937	0.0375	1.700
2	0.0645	0.1990	0.0396	1.795
3	0.0322	0.1297	0.0168	0.763
4	0.0407	0.1348	0.0182	0.824
5	0.0437	0.1650	0.0272	1.234
6	0.0743	0.2415	0.0583	2.644
7	0.0672	0.2023	0.0409	1.855
8	0.0582	0.1819	0.0331	1.500
9	0.0458	0.1475	0.0218	0.986
10	0.0574	0.1994	0.0398	1.802
11	0.0253	0.1235	0.0152	0.691
12	0.0358	0.1358	0.0184	0.835
13	0.0617	0.1966	0.0386	1.752
14	0.0629	0.2077	0.0431	1.954
15	0.1245	0.2969	0.0881	3.995
16	0.0719	0.1913	0.0366	1.658
17	0.0894	0.2533	0.0641	2.907
18	0.1008	0.2751	0.0757	3.430
19	0.0301	0.1450	0.0210	0.953
20	0.0601	0.2094	0.0439	1.988
21	0.0468	0.1870	0.0350	1.586
22	0.0504	0.1761	0.0310	1.405
23	0.0325	0.1264	0.0160	0.724
24	0.0447	0.1653	0.0273	1.238
25	0.0339	0.1301	0.0169	0.767
26	0.0435	0.1669	0.0279	1.263
27	0.0400	0.1451	0.0211	0.955
28	0.0473	0.1890	0.0357	1.620
29	0.1319	0.3215	0.1034	4.686
30	0.0786	0.2350	0.0552	2.502
31	0.0681	0.2173	0.0472	2.140
32	0.1001	0.2606	0.0679	3.079
33	0.0446	0.1653	0.0273	1.238

34	0.0476	0.1730	0.0299	1.357
35	0.0825	0.2448	0.0599	2.715
36	0.1746	0.3728	0.1390	6.299
37	0.0846	0.2517	0.0633	2.870
38	0.0414	0.1750	0.0306	1.388
39	0.0357	0.1676	0.0281	1.272
40	0.0467	0.1821	0.0332	1.503
41	0.0464	0.1992	0.0397	1.798
42	0.0758	0.2227	0.0496	2.247
43	0.0669	0.2186	0.0478	2.166
44	0.0413	0.1662	0.0276	1.252
45	0.0427	0.1620	0.0263	1.190
46	0.0234	0.1154	0.0133	0.603
47	0.0270	0.1235	0.0153	0.692
48	0.0229	0.1170	0.0137	0.620
49	0.0200	0.1156	0.0134	0.606
50	0.0278	0.1526	0.0233	1.055
51	0.0478	0.1734	0.0301	1.362
52	0.0577	0.2235	0.0499	2.263
53	0.0570	0.2165	0.0469	2.125
54	0.0935	0.2597	0.0675	3.057
55	0.0544	0.2010	0.0404	1.832
56	0.0360	0.1668	0.0278	1.261

EIGENANALYSIS UNDERWAY
THRESHOLD = 0.000000309471943
CURRENT V.= 0.000000031468002
NUMBER OF POSITIVE EIGENVALUES = 55
SUM OF POSITIVE EIGENVALUES = 0.55999996E+02
EIGENVALUES

0.1646E+02	0.5699E+01	0.4215E+01	0.2479E+01	0.2133E+01
0.1843E+01	0.1614E+01	0.1474E+01	0.1357E+01	0.1343E+01
0.1290E+01	0.1194E+01	0.1091E+01	0.1059E+01	0.1002E+01
0.9448E+00	0.8122E+00	0.7730E+00	0.7344E+00	0.6877E+00
0.6315E+00	0.6004E+00	0.5843E+00	0.5708E+00	0.5165E+00
0.4949E+00	0.4700E+00	0.4533E+00	0.4496E+00	0.4046E+00
0.3796E+00	0.3141E+00	0.2975E+00	0.2583E+00	0.2347E+00
0.2014E+00	0.1712E+00	0.1600E+00	0.1385E+00	0.1112E+00
0.8859E-01	0.7064E-01	0.6121E-01	0.4579E-01	0.3718E-01
0.2295E-01	0.1467E-01	0.9917E-02	0.3752E-02	0.2112E-02
0.1188E-02	0.3677E-03	0.3022E-03	0.9466E-04	0.6182E-04

EIGENVALUES AS PERCENT

29.38	10.18	7.53	4.43	3.81
3.29	2.88	2.63	2.42	2.40
2.30	2.13	1.95	1.89	1.79
1.69	1.45	1.38	1.31	1.23
1.13	1.07	1.04	1.02	0.92
0.88	0.84	0.81	0.80	0.72
0.68	0.56	0.53	0.46	0.42
0.36	0.31	0.29	0.25	0.20
0.16	0.13	0.11	0.08	0.07
0.04	0.03	0.02	0.01	0.00
0.00	0.00	0.00	0.00	0.00

CUMULATIVE PERCENTAGE OF EIGENVALUES

29.38	39.56	47.09	51.51	55.32
58.61	61.50	64.13	66.55	68.95
71.25	73.39	75.33	77.22	79.01

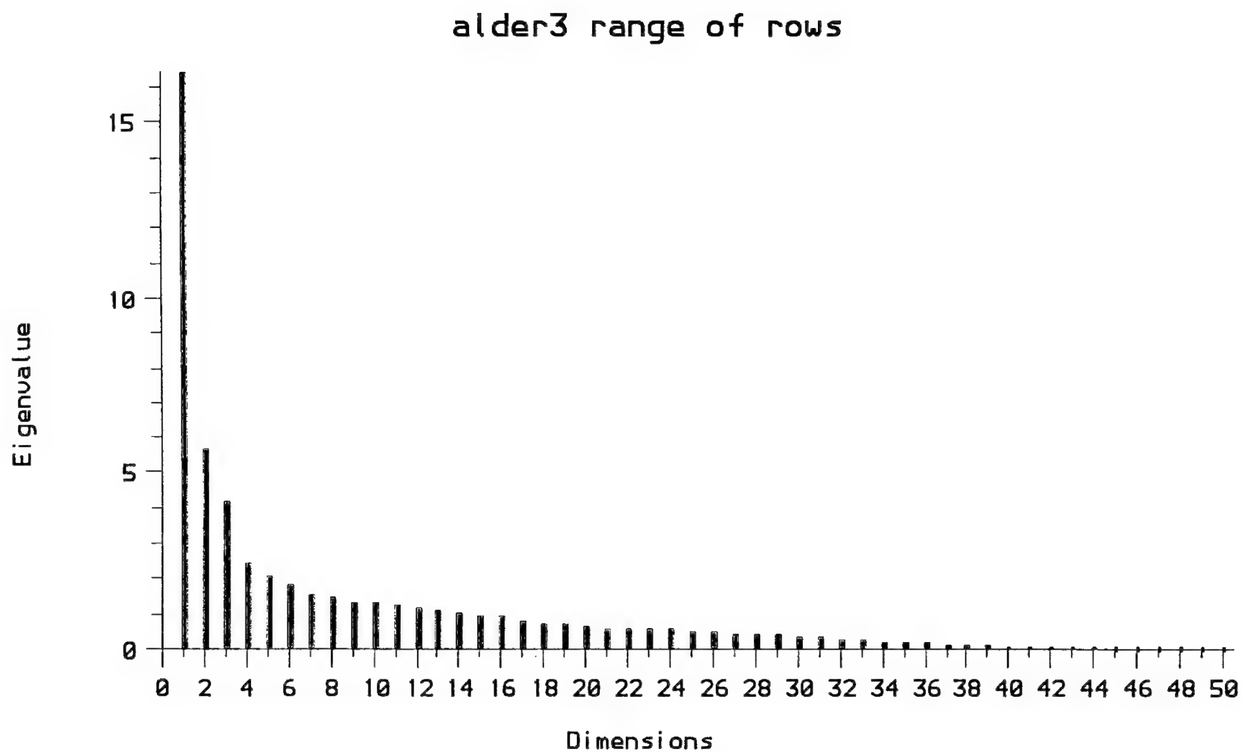
80.70	82.15	83.53	84.84	86.07
87.20	88.27	89.31	90.33	91.25
92.14	92.98	93.79	94.59	95.31
95.99	96.55	97.08	97.54	97.96
98.32	98.63	98.91	99.16	99.36
99.52	99.64	99.75	99.83	99.90
99.94	99.97	99.99	99.99	100.00
100.00	100.00	100.00	100.00	100.00

SQUARE ROOTS OF EIGENVALUES

4.056539	2.387169	2.053069	1.574462	1.460358
1.357678	1.270571	1.214194	1.164956	1.158835
1.135576	1.092564	1.044338	1.028868	1.000792
0.972029	0.901201	0.879199	0.856974	0.829284
0.794681	0.774882	0.764367	0.755517	0.718654
0.703481	0.685556	0.673293	0.670552	0.636105
0.616111	0.560471	0.545421	0.508209	0.484454
0.448784	0.413735	0.400010	0.372127	0.333405
0.297644	0.265776	0.247405	0.213997	0.192812
0.151500	0.121100	0.099582	0.061253	0.045954
0.034470	0.019177	0.017383	0.009729	0.007863

WARNING:
In the graphics window the variable scores will be rescaled

IB3. Bar graph - alder4



IB4. Range rows, non-heirarchical output - alder4

SYN-TAX –IB4

K-MEANS CLUSTERING
alder4 range of rows
INPUT AND RUN PARAMETERS
NUMBER OF VARIABLES = 79
NUMBER OF OBJECTS = 56
NUMBER OF CLUSTERS = 3
INITIAL PARTITION =RANDOM
FORMAT OF INPUT PARTITION=
NUMBER OF RUNS (SEARCHES)= 5
LABELS FOR OBJECTS =NOT USED

```
  RUN  1
 FINAL CLUSTERS: RUN 1
 CLUSTER  1
        1  2  3  4  5  6  7  9 10 11
       12 13 14 17 19 21 22 25 26 28
       29 31 39 40 45 46 48 49 51 52
       53 55 56
 CLUSTER  2
        8 20 23 24 27 30 33 35 44 50
 CLUSTER  3
       15 16 18 32 34 36 37 38 41 42
       43 47 54
  RUN  2
 FINAL CLUSTERS: RUN 2
 CLUSTER  1
        8 20 23 24 27 30 33 35 44 50
 CLUSTER  2
        1  2  3  4  5  6  7  9 10 11
       12 13 14 17 19 21 22 25 26 28
       29 31 39 40 45 46 48 49 51 52
       53 55 56
 CLUSTER  3
       15 16 18 32 34 36 37 38 41 42
       43 47 54
  RUN  3
 FINAL CLUSTERS: RUN 3
 CLUSTER  1
        1  2  3  4  5  6  7  9 10 11
       12 13 14 17 19 21 22 25 26 28
       29 31 39 40 45 46 48 49 51 52
       53 55 56
 CLUSTER  2
        8 20 23 24 27 30 33 35 44 50
 CLUSTER  3
       15 16 18 32 34 36 37 38 41 42
       43 47 54
  RUN  4

 FINAL CLUSTERS: RUN4
 CLUSTER  1
       16 32 34 36 37 38 41 42 43 47
```

54

CLUSTER 2

1 2 3 4 5 6 7 8 9 10
11 12 13 14 17 19 20 21 22 23
24 25 26 27 28 29 30 31 33 35
39 40 44 45 46 48 49 50 51 52
53 55 56

CLUSTER 3

15 18

RUN 5

FINAL CLUSTERS: RUN5

CLUSTER 1

1 2 3 4 5 6 7 9 10 11
12 13 14 17 19 21 22 25 26 28
29 31 39 40 45 46 48 49 51 52
53 55 56

CLUSTER 2

15 16 18 32 34 36 37 38 41 42
43 47 54

CLUSTER 3

8 20 23 24 27 30 33 35 44 50

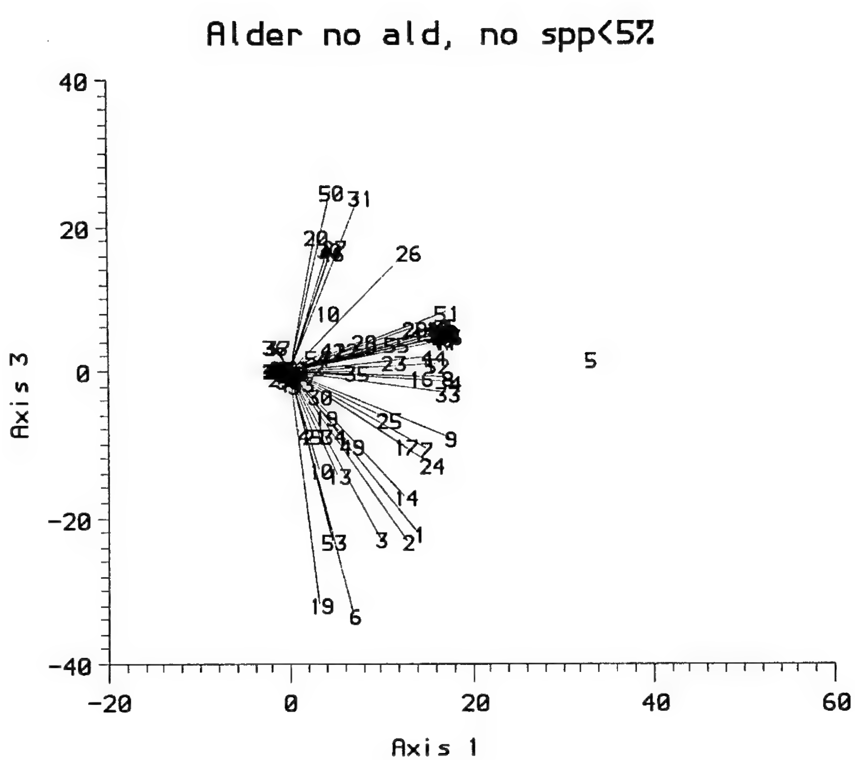
IIC. Alder Data Matrix EAFB LTVM Project (no alder shrubs or species with <5% total representation).

	TA1	TA2	TA3	TA4	TA5	TA5A	TA6	TA7	TA8	TA9	TA10	TA11	TA12	TA13	TA14	TA15	TA16	TA17	TA18	TA19	Mald	Mald2	Mald3	Mald4	Mald5	Mald6	Mald7	Mald8	Mald9	Mald10
Achmil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0
Actrub	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Alncri	0	0	0	0	0	0	0	95	0	0	0	0	0	0	0	0	0	0	0	90	10	30	85	90	0	0	90	0	0	98
Alnsin	90	95	95	95	90	80	95	0	90	95	95	95	90	95	0	45	95	0	65	0	90	65	10	0	95	93	0	80	85	0
Alnten	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	50	0	60	0	0	0	0	0	0	0	0	0	0	2	0
Athfel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Betpap	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Calcan	25	25	5	35	25	10	25	40	30	2	15	15	10	35	60	35	20	65	0	0	1	10	10	30	10	15	8	15	30	5
Carex sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cirmac	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0
Corcan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Drydil	0	0	3	2	0	15	1	1	0	1	0	0	3	5	1	10	10	1	5	0	0	2	0	10	5	0	20	0	0	15
Echhor	0	0	3	3	5	0	10	3	5	0	2	5	2	0	0	0	0	0	0	55	10	35	5	2	10	10	50	0	0	50
Epiang	0	0	0	0	0	0	0	0	0	0	0	3	0	0	2	2	0	3	0	0	0	0	1	0	0	0	0	0	1	0
Equarv	5	5	1	3	0	5	0	5	4	5	0	2	0	5	0	5	5	0	0	0	0	0	0	0	0	13	1	1	0	2
Equflu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	1	15	0	0	0	0	0	0	0	0	0	0	0	0
Equsil	0	0	1	0	0	0	0	0	2	10	0	0	40	0	0	0	0	0	0	10	0	0	0	8	5	0	5	0	0	0
Galbor	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	5	10	0	2	2	2	1	0	1
Galtri	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Galtrif	0	0	0	1	2	0	5	5	1	2	0	0	3	0	1	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0
Geumac	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Gymdry	20	30	2	5	0	20	2	0	10	0	0	3	15	45	1	10	20	0	5	10	0	40	0	10	0	0	0	0	0	10
Herlan	0	0	0	0	0	0	0	0	0	1	0	0	0	0	5	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0
Ledgro	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Linbor	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lycann	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	2
Mentri	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Moelat	0	0	1	2	0	0	0	1	0	10	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Osmdep	0	0	0	1	2	0	5	10	0	0	5	5	0	0	0	0	0	0	0	0	10	1	2	0	5	0	0	0	0	0
Potpal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ribbra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0
Ribhud	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	2	5	0	0	0	0
Ribtri	15	10	5	5	2	20	15	15	10	2	0	0	5	10	0	0	0	0	10	10	0	0	10	0	0	0	0	0	0	15
Rosaci	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
Rubida	2	3	0	2	1	0	0	1	3	3	2	5	1	2	0	1	0	0	0	5	0	3	0	0	0	1	0	30	0	0
Salbeb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0
Samrac	15	15	10	5	2	35	20	5	10	5	2	5	5	5	0	1	0	0	35	0	20	0	2	15	15	0	10	0	0	0
Stramp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Taroff	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Thaspa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trieur	10	10	2	2	0	0	3	2	5	0	0	0	3	2	2	2	0	1	0	0	0	0	0	0	0	1	0	0	1	0
Vacvit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vibedu	5	5	0	1	0	10	0	1	0	0	0	0	2	10	0	0	0	0	0	0	0	10	0	0	0	2	5	1	0	0
Viospp	0	0	0	0	0	0	0	1	0	0	0	0	0	0	15	25	10	20	0	0	0	0	0	0	0	0	0	0	0	0
Drespp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Eurpul	3	5	5	5	5	1	5	5	5	5	3	5	10	5	0	2	5	0	0	10	1	1	1	1	1	0	0	0	0	0
Liverwort	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0
Mnium spp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	5	0	10	0	0	0	0	0	0	0	0	0	0	0	0
Plesch	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3	0	0	0	0	20	0
Sphspp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unkmoss	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	192	204	133	167	135	196	186	190	175	143	124	143	192	219	176	203	179	186	120	193	163	202	136	179	150	142	192	130	153	199

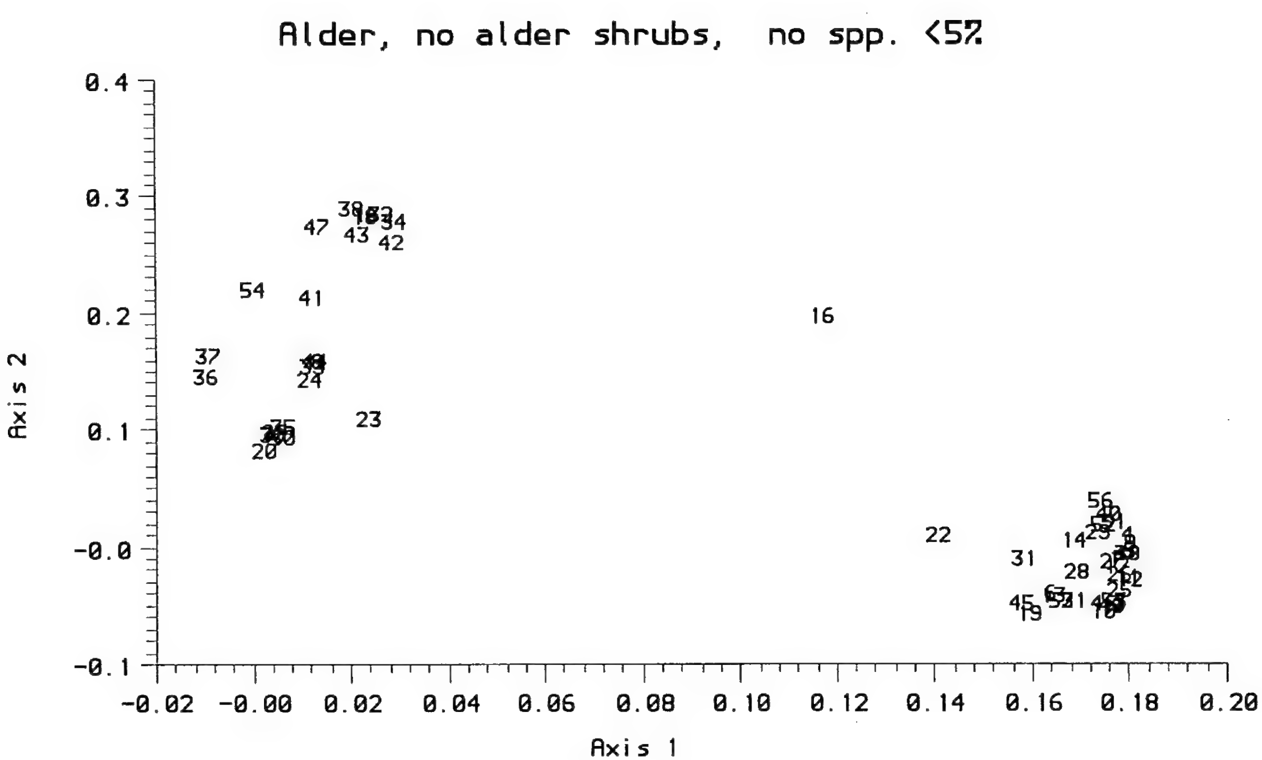
IIC. Alder Data Matrix EAFB LTVM Project (no alder shrubs or species with <5% total representation).

	Mald11	Mald12	Mald13	Mald14	Mald15	Mald16	Mald17	Mald18	Mald19	Mald20	Mald21	SK1	SK2	SK3	SK4	SK5	SK6	SK7	SK8	SK9	SK10	SK11	SK12	SK13	SK14	SK15		
Achmil	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0		9
Actrub	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0		5
Alncri	0	0	96	0	95	0	0	0	0	0	0	0	0	95	0	0	0	0	0	90	0	0	0	0	0	0		964
Alnsin	98	0	0	0	0	0	0	0	96	97	5	0	0	0	95	90	0	95	95	0	95	95	95	0	95	95		3069
Alnten	0	70	0	55	0	40	45	90	0	0	90	50	75	0	0	0	90	0	0	0	0	0	0	60	0	0		832
Athfel	0	0	1	0	5	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2	0	0		9
Betpap	0	0	0	0	0	2	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		14
Calcan	20	85	35	80	10	0	1	60	25	45	10	90	80	40	3	2	35	25	2	10	40	40	5	5	5	50		1414
Carex sp.	0	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		30
Cirmac	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		5
Corcan	0	1	0	1	0	35	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0		46
Drydil	0	0	2	5	0	0	1	0	0	0	0	3	0	0	50	0	0	0	0	1	0	0	0	0	0	0		172
Echhor	60	0	0	0	35	0	0	0	0	0	0	1	0	4	5	20	0	0	0	80	15	0	2	0	0	0		487
Epiang	0	0	0	0	0	10	0	0	5	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0		30
Equarv	10	10	1	0	5	0	2	10	3	0	50	10	4	0	0	0	10	10	0	0	0	0	2	1	2	2		199
Equflu	0	5	0	5	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		41
Equsil	0	0	10	0	1	0	0	0	0	0	0	0	0	0	2	0	7	0	0	0	0	0	0	1	0	0		102
Galbor	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		47
Galtri	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		5
Galtrif	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	3	5	0	3	15	2	1	0	1		57
Geumac	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		11
Gymdry	5	2	5	0	2	0	0	0	0	0	0	2	2	0	1	5	0	0	0	0	0	0	43	2	0	0		327
Herlan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0		19
Ledgro	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		5
Linbor	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		6
Lycann	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		5
Mentri	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		10
Moelat	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	1	0	0	0	0	0	2	0		23
Osmdep	0	0	0	0	0	0	0	1	0	2	0	0	0	2	0	0	1	0	0	0	2	12	1	0	0	0		67
Potpal	0	0	0	2	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		7
Ribbra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		5
Ribhud	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		17
Ribtri	5	5	3	0	10	0	0	0	0	0	0	0	1	20	3	7	1	0	0	0	10	0	20	1	1	0		246
Rosaci	3	2	0	12	0	1	0	1	0	0	0	3	2	0	0	0	0	0	0	0	0	0	0	6	0	1		33
Rubida	0	0	2	5	1	0	0	0	0	0	0	2	5	0	0	0	1	1	0	0	0	0	0	4	4	3		93
Salbeb	0	0	0	0	0	15	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		23
Samrac	0	0	4	0	30	0	0	2	0	0	0	0	0	1	10	0	0	1	2	5	5	5	5	0	0	1		308
Stramp	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0		5
Taroff	0	0	0	0	0	0	0	0	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		8
Thaspa	0	2	0	0	0	0	0	0	0	0	0	3	5	0	0	0	0	0	0	0	0	0	0	1	0	0		11
Trieur	1	0	1	0	1	0	0	0	0	0	0	0	2	1	1	0	0	0	0	0	1	0	1	0	1	0		56
Vacvit	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		10
Vibedu	10	0	0	2	2	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0		68
Viospp	0	10	0	0	4	0	1	1	0	0	0	0	20	0	0	0	1	0	0	0	2	0	0	29	0	0		139
Drespp	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0		11
Eurpul	0	0	1	0	10	0	0	0	0	0	0	0	0	0	0	2	1	0	1	0	0	0	0	0	0	0		104
Liverwort	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		10
Mnium spp	0	2	0	0	0	0	2	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0		34
Plesch	0	5	0	1	0	2	0	0	0	1	0	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0		63
Sphspp	0	20	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		40
Unkmoss	0	0	0	0	0	0	0	0	0	0	0	10	50	15	10	0	0	0	0	0	0	0	0	0	1	0		86
	212	222	161	168	213	125	137	170	131	147	156	220	248	180	184	126	148	136	106	186	178	167	176	119	116	153	9387	9387

IIC1. Biplot . Axes 1 vs 3 - no spp.<5%



IIC2. Scattergram Axes1/2 - no spp.<5%



SYN-TAX-IIC3

```
K-MEANS CLUSTERING
Alder,  no spp. <5%


INPUT AND RUN PARAMETERS
NUMBER OF VARIABLES       =    51
NUMBER OF OBJECTS         =    56
NUMBER OF CLUSTERS        =     2
INITIAL PARTITION        =RANDOM
FORMAT OF INPUT PARTITION=
NUMBER OF RUNS (SEARCHES)=     5
LABELS FOR OBJECTS       =NOT USED



     RUN     1


    FINAL CLUSTERS:


    CLUSTER  1
                     1   2   3   4   5   6   7   9  10  11
                    12  13  14  17  19  21  22  25  26  28
                    29  31  39  40  45  46  48  49  51  52
                    53  55  56

    CLUSTER  2
                     8  15  16  18  20  23  24  27  30  32
                    33  34  35  36  37  38  41  42  43  44
                    47  50  54


     RUN     2


    FINAL CLUSTERS:


    CLUSTER  1
                     8  15  16  18  20  23  24  27  30  32
                    33  34  35  36  37  38  41  42  43  44
                    47  50  54

    CLUSTER  2
                     1   2   3   4   5   6   7   9  10  11
                    12  13  14  17  19  21  22  25  26  28
                    29  31  39  40  45  46  48  49  51  52
                    53  55  56


     RUN     3
```

I

FINAL CLUSTERS:

CLUSTER 1

1	2	3	4	5	6	7	9	10	11
12	13	14	17	19	21	22	25	26	28
29	31	39	40	45	46	48	49	51	52
53	55	56							

CLUSTER 2

8	15	16	18	20	23	24	27	30	32
33	34	35	36	37	38	41	42	43	44
47	50	54							

RUN 4

FINAL CLUSTERS:

CLUSTER 1

8	15	16	18	20	23	24	27	30	32
33	34	35	36	37	38	41	42	43	44
47	50	54							

CLUSTER 2

1	2	3	4	5	6	7	9	10	11
12	13	14	17	19	21	22	25	26	28
29	31	39	40	45	46	48	49	51	52
53	55	56							

RUN 5

FINAL CLUSTERS:

CLUSTER 1

1	2	3	4	5	6	7	9	10	11
12	13	14	15	16	17	18	19	21	22
25	26	28	29	31	32	34	36	37	38
39	40	41	42	43	45	46	47	48	49
51	52	53	54	55	56				

CLUSTER 2

8	20	23	24	27	30	33	35	44	50

IIID. Alnus sinuata Plots

	TA1	TA2	TA3	TA4	TA5	TA5A	TA6	TA8	TA9	TA10	TA11	TA12	TA13	TA16	TA18	Mald	Mald2	Mald5	Mald6	Mald8	Mald9	Mald11	Mald19	Mald20	SK4	SK5	SK7	SK8	SK10	SK11	SK12	SK14	SK15
Achmil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0
Actrub	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0
Alncri	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Alnsin	90	95	95	95	90	80	95	90	95	95	95	90	95	95	65	90	65	95	93	80	85	98	96	97	95	90	95	95	95	95	95	95	95
Alnten	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Angluc	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
Athfel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Betpapsa	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bosros	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Calcan	25	25	5	35	25	10	25	30	2	15	15	10	35	20	0	1	10	10	15	15	30	20	25	45	3	2	25	2	40	40	5	5	50
Carsp1	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corcan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Drydil	0	0	3	2	0	15	1	0	1	0	0	3	5	10	5	0	2	5	0	0	0	0	0	0	50	0	0	0	0	0	0	0	0
Echhor	0	0	3	3	5	0	10	5	0	2	5	2	0	0	0	10	35	10	10	0	0	60	0	0	5	20	0	0	15	0	2	0	0
Epiang	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	1	0	5	0	0	0	0	0	0	0	0	1	0
Equarv	5	5	1	3	0	5	0	4	5	0	2	0	5	5	0	0	0	0	13	1	0	10	3	0	0	0	10	0	0	0	2	2	2
Equflu	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Equsil	0	0	1	0	0	0	0	2	10	0	0	40	0	0	0	0	0	5	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Galbor	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	20	5	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Galtri	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Galtrif	0	0	0	1	2	0	5	1	2	0	0	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0	3	5	3	15	2	0	1
Gymdry	20	30	2	5	0	20	2	10	0	0	3	15	45	20	5	0	40	0	0	0	0	5	0	0	1	5	0	0	0	0	43	0	0
Herlan	0	0	0	0	0	0	0	0	1	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
Linbor	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Moelat	0	0	1	2	0	0	0	0	10	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	2	0
Osmdep	0	0	0	1	2	0	5	0	0	5	5	0	0	0	0	10	1	5	0	0	0	0	0	2	0	0	0	0	2	12	1	0	0
Picgla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Picglasa	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plaspp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Popbal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Ribbra	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ribhud	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ribtri	15	10	5	5	2	20	15	10	2	0	0	5	10	0	10	0	0	0	0	0	0	5	0	0	3	7	0	0	10	0	20	1	0
Rosaci	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	3	0	0	0	0	0	0	0	0	0	0	1
Rubida	2	3	0	2	1	0	0	3	3	2	5	1	2	0	0	0	3	0	1	30	0	0	0	0	0	0	1	0	0	0	0	4	3
Rubspp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	0
Salbeb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0
Salspp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Samrac	15	15	10	5	2	35	20	10	5	2	5	5	5	0	35	20	0	15	0	0	0	0	0	0	10	0	1	2	5	5	5	0	1
Stespp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Stramp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Taroff	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	0	2	1	0	0	0	0	0	0	0	0	0
Trieur	10	10	2	2	0	0	3	5	0	0	0	3	2	0	0	0	0	0	1	0	1	1	0	0	1	0	0	0	1	0	1	1	0
Trifspp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Unkgra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Urtgra	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vibedu	5	5	0	1	0	10	0	0	0	0	0	2	10	0	0	0	10	0	2	1	0	10	0	0	2	0	0	0	0	0	0	0	0
Viospp	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
Cerpup	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Eurpul	3	5	5	5	5	1	5	5	5	3	5	10	5	5	0	1	1	1	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0
Plesch	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	20	0	0	1	0	0	0	0	0	0	0	0	0
Polssp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Unkmoss	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	1	0

IIID1. ORDIN output - *A. sinuata*

SYN-TAX - IIID1

PRINCIPAL COMPONENT ANALYSIS
A. sinuata run 1
NUMBER OF OBJECTS - ROWS = 53
NUMBER OF VARIABLES - COLS = 33
NO. OF AXES RETAINED = 4
TYPE OF ANALYSIS = CORRELATION
PRINTOUT = SHORT
LABELS FOR OBJECTS = NOT USED
LABELS FOR VARIABLES = NOT USED
OBJECT SCORES = SAVED
VARIABLE SCORES = SAVED
EIGENVALUES = NOT SAVED
RESEMBLANCE MATRIX = SAVED
BIPLOT = EUCLIDEAN
VARIABLES STATISTICS
POOLED VARIANCE = 5932.9858

VARIABLE	MEAN	STANDARD DEVIATION	VARIANCE	VARIANCE AS %
1	3.6226	13.1898	173.9702	2.932
2	3.8491	14.0567	197.5922	3.330
3	2.5094	13.0791	171.0624	2.883
4	3.1509	13.7706	189.6306	3.196
5	2.5660	12.7438	162.4042	2.737
6	3.7170	12.5152	156.6299	2.640
7	3.5283	13.7318	188.5617	3.178
8	3.3019	13.0289	169.7533	2.861
9	2.6981	13.1128	171.9456	2.898
10	2.3396	13.1602	173.1901	2.919
11	2.6981	13.1640	173.2917	2.921
12	3.6226	13.5338	183.1626	3.087
13	4.1321	14.9859	224.5784	3.785
14	3.4151	13.5269	182.9782	3.084
15	2.2642	10.1226	102.4674	1.727
16	3.0755	12.9360	167.3403	2.821
17	3.8113	11.9455	142.6945	2.405
18	2.8302	13.2356	175.1822	2.953
19	2.6981	13.0038	169.0994	2.850
20	2.4717	11.7729	138.6002	2.336
21	3.0189	12.5077	156.4419	2.637
22	4.0377	15.8126	250.0370	4.214
23	2.4717	13.5556	183.7540	3.097
24	2.8113	14.5616	212.0406	3.574
25	3.4717	14.6374	214.2540	3.611
26	2.3774	12.6205	159.2780	2.685
27	2.5660	13.4544	181.0196	3.051
28	2.0000	13.0443	170.1538	2.868
29	3.3585	14.1559	200.3882	3.378
30	3.1698	14.2015	201.6821	3.399
31	3.3396	14.3767	206.6901	3.484
32	2.2264	13.0290	169.7554	2.861
33	2.9057	14.6067	213.3563	3.596

EIGENANALYSIS UNDERWAY
THRESHOLD = 0.000000888935233
CURRENT V.= 0.000000749573701
NUMBER OF POSITIVE EIGENVALUES = 33
SUM OF POSITIVE EIGENVALUES = 0.33000008E+02
EIGENVALUES

0.2987E+02	0.7974E+00	0.6527E+00	0.5296E+00	0.3100E+00
0.2174E+00	0.1651E+00	0.1181E+00	0.1087E+00	0.5640E-01
0.4367E-01	0.2727E-01	0.2390E-01	0.2080E-01	0.1475E-01
0.1204E-01	0.9353E-02	0.6167E-02	0.5851E-02	0.3225E-02
0.2794E-02	0.1731E-02	0.1032E-02	0.7458E-03	0.3004E-03
0.1736E-03	0.1287E-03	0.7653E-04	0.3816E-04	0.2182E-04
0.1471E-04	0.4598E-05	0.2624E-05		

EIGENVALUES AS PERCENT

90.52	2.42	1.98	1.60	0.94
0.66	0.50	0.36	0.33	0.17
0.13	0.08	0.07	0.06	0.04
0.04	0.03	0.02	0.02	0.01
0.01	0.01	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00		

CUMULATIVE PERCENTAGE OF EIGENVALUES

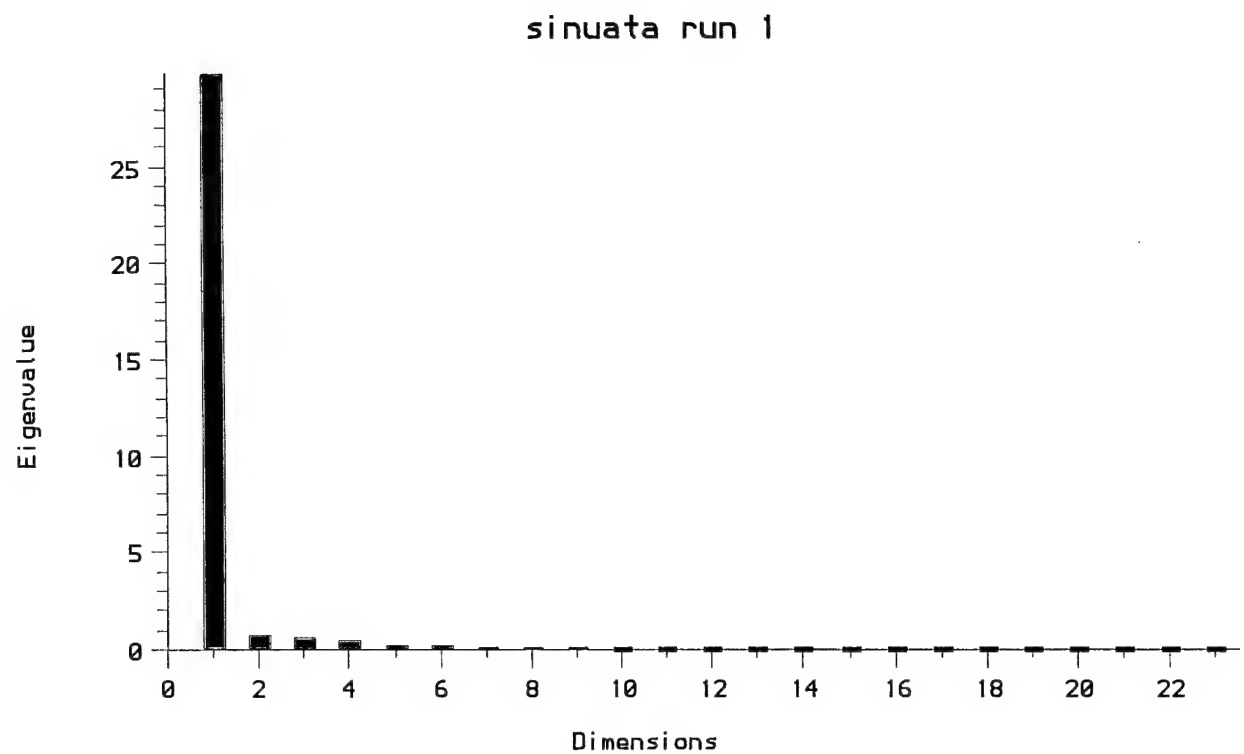
90.52	92.93	94.91	96.52	97.46
98.11	98.61	98.97	99.30	99.47
99.60	99.69	99.76	99.82	99.87
99.90	99.93	99.95	99.97	99.98
99.99	99.99	100.00	100.00	100.00
100.00	100.00	100.00	100.00	100.00
100.00	100.00	100.00		

SQUARE ROOTS OF EIGENVALUES

5.465394	0.892981	0.807921	0.727751	0.556759
0.466211	0.406364	0.343619	0.329635	0.237492
0.208976	0.165144	0.154597	0.144233	0.121461
0.109743	0.096713	0.078528	0.076495	0.056785
0.052859	0.041602	0.032131	0.027310	0.017333
0.013176	0.011344	0.008748	0.006178	0.004671
0.003835	0.002144	0.001620		

WARNING:
In the graphics window the variable scores will be rescaled

IIID2. Bar graph - *A. sinuata*



IIID3. Non-heirarchical output - *A. sinuata*

SYN-TAX - IIID3

K-MEANS CLUSTERING A. sinuata

```
INPUT AND RUN PARAMETERS
NUMBER OF VARIABLES     =  53
NUMBER OF OBJECTS       =  33
NUMBER OF CLUSTERS      =   2
INITIAL PARTITION       =RANDOM
FORMAT OF INPUT PARTITION=
NUMBER OF RUNS (SEARCHES)=  5
LABELS FOR OBJECTS      =NOT USED
  RUN  1
  INITIAL PARTITION GENERATED AT RANDOM
  INITIAL PARTITION
  CLUSTER 1
        1  2  3  5  7 10 15 16 17 20
       21 23 24 25 28 29 30 31 32 33
  CLUSTER 2
        4  6  8  9 11 12 13 14 18 19
       22 26 27
 STEP  OBJECT FROM CLUSTER TO CLUSTER      SSQ
  0                           0.31243E+05
  1   17       1       2     0.30616E+05
  2   31       1       2     0.29998E+05
  3    2       1       2     0.29595E+05
  4   27       2       1     0.29212E+05
  5    4       2       1     0.28841E+05
  6    1       1       2     0.28558E+05
  7   15       1       2     0.28215E+05
  8   19       2       1     0.27924E+05
  9   11       2       1     0.27574E+05
 10    9       2       1     0.27253E+05
 11   18       2       1     0.26876E+05
 12   26       2       1     0.26738E+05
 13   22       2       1     0.26337E+05
 14    8       2       1     0.26144E+05
 15   14       2       1     0.26044E+05
 16   12       2       1     0.26005E+05
GROUP MEMBERSHIP VECTOR FOR FINAL PARTITION
 2 2 1 1 1  2 1 1 1 1  1 1 2 1 2  1 2 1 1 1
 1 1 1 1 1  1 1 1 1 1  2 1 1
  FINAL CLUSTERS:
  CLUSTER 1
        3  4  5  7  8  9 10 11 12 14
       16 18 19 20 21 22 23 24 25 26
       27 28 29 30 32 33
  CLUSTER 2
        1  2  6 13 15 17 31
  RUN  2
  INITIAL PARTITION GENERATED AT RANDOM
  INITIAL PARTITION
  CLUSTER 1
```

```
         3  4  5  7  8 11 13 20 26 27
        28 29 32 33
  CLUSTER  2
         1  2  6  9 10 12 14 15 16 17
        18 19 21 22 23 24 25 30 31
 STEP   OBJECT FROM CLUSTER TO CLUSTER      SSQ
  0                           0.30831E+05
  1    24        2       1    0.30197E+05
  2    30        2       1    0.29497E+05
  3    21        2       1    0.28950E+05
  4    23        2       1    0.28359E+05
  5    26        1       2    0.27914E+05
  6    10        2       1    0.27590E+05
  7    13        1       2    0.27237E+05
  8    19        2       1    0.26941E+05
  9     3        1       2    0.26822E+05
 10    22        2       1    0.26767E+05
 11    28        1       2    0.26732E+05
 12    32        1       2    0.26679E+05
GROUP MEMBERSHIP VECTOR FOR FINAL PARTITION
  2 2 2 1 1   2 1 1 2 1   1 2 2 2 2   2 2 2 1 1
  1 1 1 1 2   2 1 2 1 1   2 2 1
  FINAL CLUSTERS:
  CLUSTER  1
         4  5  7  8 10 11 19 20 21 22
        23 24 27 29 30 33
  CLUSTER  2
         1  2  3  6  9 12 13 14 15 16
        17 18 25 26 28 31 32
   RUN   3
  INITIAL PARTITION GENERATED AT RANDOM
  INITIAL PARTITION
  CLUSTER  1
         3  4  5  7 10 13 14 16 17 19
        20 21 22 23 24 25 26 27 29 31
        32 33
  CLUSTER  2
         1  2  6  8  9 11 12 15 18 28
        30
 STEP   OBJECT FROM CLUSTER TO CLUSTER      SSQ
  0                           0.30383E+05
  1    31        1       2    0.29908E+05
  2    30        2       1    0.29326E+05
  3    17        1       2    0.28833E+05
  4    13        1       2    0.28210E+05
  5    11        2       1    0.27824E+05
  6    28        2       1    0.27388E+05
  7    18        2       1    0.26914E+05
  8     9        2       1    0.26303E+05
  9     8        2       1    0.26044E+05
 10    12        2       1    0.26005E+05
GROUP MEMBERSHIP VECTOR FOR FINAL PARTITION
  2 2 1 1 1   2 1 1 1 1   1 1 2 1 2   1 2 1 1 1
  1 1 1 1 1   1 1 1 1 1   2 1 1
  FINAL CLUSTERS:
  CLUSTER  1
```

3 4 5 7 8 9 10 11 12 14
16 18 19 20 21 22 23 24 25 26
27 28 29 30 32 33
CLUSTER 2
1 2 6 13 15 17 31
RUN 4
INITIAL PARTITION GENERATED AT RANDOM
INITIAL PARTITION
CLUSTER 1
1 2 4 5 6 7 10 11 13 16
17 18 19 20 21 24 25 26 27 30
32 33
CLUSTER 2
3 8 9 12 14 15 22 23 28 29
31

STEP	OBJECT	FROM CLUSTER	TO CLUSTER	SSQ
0				0.31215E+05
1	17	1	2	0.30638E+05
2	29	2	1	0.30188E+05
3	23	2	1	0.29698E+05
4	6	1	2	0.29162E+05
5	25	1	2	0.28657E+05
6	8	2	1	0.28205E+05
7	16	1	2	0.27736E+05
8	26	1	2	0.27209E+05
9	18	1	2	0.26927E+05
10	14	2	1	0.26693E+05
11	32	1	2	0.26563E+05

GROUP MEMBERSHIP VECTOR FOR FINAL PARTITION
1 1 2 1 1 2 1 1 2 1 1 2 1 1 2 2 2 2 1 1
1 2 1 1 2 2 1 2 1 1 2 2 1
FINAL CLUSTERS:
CLUSTER 1
1 2 4 5 7 8 10 11 13 14
19 20 21 23 24 27 29 30 33
CLUSTER 2
3 6 9 12 15 16 17 18 22 25
26 28 31 32
RUN 5
INITIAL PARTITION GENERATED AT RANDOM
INITIAL PARTITION
CLUSTER 1
1 3 10 12 13 16 17 19 21 24
25 29 30 31 32
CLUSTER 2
2 4 5 6 7 8 9 11 14 15
18 20 22 23 26 27 28 33

STEP	OBJECT	FROM CLUSTER	TO CLUSTER	SSQ
0				0.31404E+05
1	22	2	1	0.31149E+05
2	25	1	2	0.30880E+05
3	3	1	2	0.30614E+05
4	16	1	2	0.30277E+05
5	32	1	2	0.29865E+05
6	33	2	1	0.29445E+05
7	2	2	1	0.29064E+05

8	10	1	2	0.28704E+05
9	19	1	2	0.28395E+05
10	12	1	2	0.28102E+05
11	4	2	1	0.27808E+05
12	8	2	1	0.27484E+05
13	14	2	1	0.27323E+05
14	7	2	1	0.27265E+05
15	5	2	1	0.27229E+05
16	27	2	1	0.27141E+05
17	23	2	1	0.26954E+05
18	17	1	2	0.26910E+05
19	31	1	2	0.26638E+05
20	22	1	2	0.26460E+05

GROUP MEMBERSHIP VECTOR FOR FINAL PARTITION

1 1 2 1 1 2 1 1 2 2 2 2 1 1 2 2 2 2 2 2
1 2 1 1 2 2 1 2 1 1 2 2 1

FINAL CLUSTERS:

CLUSTER 1

1 2 4 5 7 8 13 14 21 23
24 27 29 30 33

CLUSTER 2

3 6 9 10 11 12 15 16 17 18
19 20 22 25 26 28 31 32

IVE. Alder Data Matrix EAFB LTVM Project - Without Alder Shrubs

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
	TA1	TA2	TA3	TA4	TA5	TA5A	TA6	TA7	TA8	TA9	TA10	TA11	TA12	TA13	TA14	TA15	TA16	TA17	TA18	TA19	Mald	Mald2	Mald3	Mald4	Mald5	Mald6	Mald7	Mald8	Mald9	Mald10
Achmil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0
Actrub	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Athfel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Betpap	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Calcan	25	25	5	35	25	10	25	40	30	2	15	15	10	35	60	35	20	65	0	0	1	10	10	30	10	15	8	15	30	5
Carex sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cirmac	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0
Corcan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Drydil	0	0	3	2	0	15	1	1	0	1	0	0	3	5	1	10	10	1	5	0	0	2	0	10	5	0	20	0	0	15
Echhor	0	0	3	3	5	0	10	3	5	0	2	5	2	0	0	0	0	0	0	55	10	35	5	2	10	10	50	0	0	50
Epiang	0	0	0	0	0	0	0	0	0	0	0	3	0	0	2	2	0	3	0	0	0	0	1	0	0	0	0	0	1	0
Equarv	5	5	1	3	0	5	0	5	4	5	0	2	0	5	0	5	5	0	0	0	0	0	0	0	0	13	1	1	0	2
Equflu	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	1	15	0	0	0	0	0	0	0	0	0	0	0	0
Equsil	0	0	1	0	0	0	0	0	2	10	0	0	40	0	0	0	0	0	0	10	0	0	0	8	5	0	5	0	0	0
Galbor	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	5	10	0	2	2	2	1	0	1
Galtri	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Galtrif	0	0	0	1	2	0	5	5	1	2	0	0	3	0	1	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0
Geumac	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	3	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Gymdry	20	30	2	5	0	20	2	0	10	0	0	3	15	45	1	10	20	0	5	10	0	40	0	10	0	0	0	0	0	10
Herlan	0	0	0	0	0	0	0	0	0	1	0	0	0	0	5	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0
Ledgro	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Linbor	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lycann	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	2
Mentri	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Moelat	0	0	1	2	0	0	0	1	0	10	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Osmdep	0	0	0	1	2	0	5	10	0	0	5	5	0	0	0	0	0	0	0	0	10	1	2	0	5	0	0	0	0	0
Potpal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ribbra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0
Ribhud	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	2	5	0	0	0	0
Ribtri	15	10	5	5	2	20	15	15	10	2	0	0	5	10	0	0	0	0	10	10	0	0	10	0	0	0	0	0	0	15
Rosaci	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
Rubida	2	3	0	2	1	0	0	1	3	3	2	5	1	2	0	1	0	0	0	5	0	3	0	0	0	1	0	30	0	0
Salbeb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0
Samrac	15	15	10	5	2	35	20	5	10	5	2	5	5	5	0	1	0	0	35	0	20	0	2	15	15	0	10	0	0	0
Stramp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Taroff	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Thaspa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trieur	10	10	2	2	0	0	3	2	5	0	0	0	3	2	2	2	0	1	0	0	0	0	0	0	0	1	0	0	1	0
Vacvit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vibedu	5	5	0	1	0	10	0	1	0	0	0	0	2	10	0	0	0	0	0	0	0	10	0	0	0	2	5	1	0	0
Viospp	0	0	0	0	0	0	0	1	0	0	0	0	0	0	15	25	10	20	0	0	0	0	0	0	0	0	0	0	0	0
Drespp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Eurpul	3	5	5	5	5	1	5	5	5	5	3	5	10	5	0	2	5	0	0	10	1	1	1	1	1	0	0	0	0	0
Liverwort	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0
Mnium spp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	5	0	10	0	0	0	0	0	0	0	0	0	0	0	0
Plesch	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3	0	0	0	0	20	0
Sphspp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unkmoss	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sum of cover values	102	109	38	72	45	116	91	95	85	48	29	48	102	124	121	108	84	126	55	103	63	107	41	89	55	49	102	50	66	101

IVE. Alder Data Matrix EAFB LTVM Project - Without Alder Shrubs

	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56		
	Mald11	Mald12	Mald13	Mald14	Mald15	Mald16	Mald17	Mald18	Mald19	Mald20	Mald21	SK1	SK2	SK3	SK4	SK5	SK6	SK7	SK8	SK9	SK10	SK11	SK12	SK13	SK14	SK15		Sum of cover values
Achmil	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0		9
Actrub	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0		5
Athfel	0	0	1	0	5	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2	0	0		9
Betpap	0	0	0	0	0	2	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		14
Calcan	20	85	35	80	10	0	1	60	25	45	10	90	80	40	3	2	35	25	2	10	40	40	5	5	5	50		1414
Carex sp.	0	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		30
Cirmac	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		5
Corcan	0	1	0	1	0	35	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0		46
Drydil	0	0	2	5	0	0	1	0	0	0	0	3	0	0	50	0	0	0	0	1	0	0	0	0	0	0		172
Echhor	60	0	0	0	35	0	0	0	0	0	0	1	0	4	5	20	0	0	0	80	15	0	2	0	0	0		487
Epiang	0	0	0	0	0	10	0	0	5	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0		30
Equarv	10	10	1	0	5	0	2	10	3	0	50	10	4	0	0	0	10	10	0	0	0	0	2	1	2	2		199
Equflu	0	5	0	5	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		41
Equsil	0	0	10	0	1	0	0	0	0	0	0	0	0	0	2	0	7	0	0	0	0	0	0	1	0	0		102
Galbor	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		47
Galtri	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		5
Galtrif	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	3	5	0	3	15	2	1	0	1		57
Geumac	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		11
Gymdry	5	2	5	0	2	0	0	0	0	0	0	2	2	0	1	5	0	0	0	0	0	0	43	2	0	0		327
Herlan	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0		19
Ledgro	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		5
Linbor	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		6
Lycann	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		5
Mentri	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		10
Moelat	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	1	0	0	0	0	0	2	0		23
Osmdep	0	0	0	0	0	0	0	1	0	2	0	0	0	2	0	0	1	0	0	0	2	12	1	0	0	0		67
Potpal	0	0	0	2	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		7
Ribbra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		5
Ribhud	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		17
Ribtri	5	5	3	0	10	0	0	0	0	0	0	0	1	20	3	7	1	0	0	0	10	0	20	1	1	0		246
Rosaci	3	2	0	12	0	1	0	1	0	0	0	3	2	0	0	0	0	0	0	0	0	0	0	6	0	1		33
Rubida	0	0	2	5	1	0	0	0	0	0	0	2	5	0	0	0	1	1	0	0	0	0	0	4	4	3		93
Salbeb	0	0	0	0	0	15	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		23
Samrac	0	0	4	0	30	0	0	2	0	0	0	0	0	1	10	0	0	1	2	5	5	5	5	0	0	1		308
Stramp	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0		5
Taroff	0	0	0	0	0	0	0	0	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		8
Thaspa	0	2	0	0	0	0	0	0	0	0	0	3	5	0	0	0	0	0	0	0	0	0	0	1	0	0		11
Trieur	1	0	1	0	1	0	0	0	0	0	0	0	2	1	1	0	0	0	0	0	1	0	1	0	1	0		56
Vacvit	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		10
Vibedu	10	0	0	2	2	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0		68
Viospp	0	10	0	0	4	0	1	1	0	0	0	0	20	0	0	0	1	0	0	0	2	0	0	29	0	0		139
Drespp	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0		11
Eurpul	0	0	1	0	10	0	0	0	0	0	0	0	0	0	0	2	1	0	1	0	0	0	0	0	0	0		104
Liverwort	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		10
Mnium spp	0	2	0	0	0	0	2	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0		34
Plesch	0	5	0	1	0	2	0	0	0	1	0	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0		63
Sphspp	0	20	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		40
Unkmoss	0	0	0	0	0	0	0	0	0	0	0	10	50	15	10	0	0	0	0	0	0	0	0	0	1	0		86
Sum of cover values	114	152	65	113	118	85	92	80	35	50	61	170	173	85	89	36	58	41	11	96	83	72	81	59	21	58	#	4522

IVE1. Ordination - no alder, no ssp<5%

SYN-TAX - IVE1

PRINCIPAL COMPONENT ANALYSIS
Alder no ald, no spp<5%
NUMBER OF OBJECTS - ROWS = 48
NUMBER OF VARIABLES - COLS = 56
NO. OF AXES RETAINED = 4
TYPE OF ANALYSIS = CORRELATION
PRINTOUT = SHORT
LABELS FOR OBJECTS = NOT USED
LABELS FOR VARIABLES = NOT USED
OBJECT SCORES = SAVED
VARIABLE SCORES = SAVED
EIGENVALUES = SAVED
RESEMBLANCE MATRIX = SAVED
BIPLOT = EUCLIDEAN
VARIABLES STATISTICS
POOLED VARIANCE = 2583.2759

VARIABLE	MEAN	STANDARD DEVIATION	VARIANCE	VARIANCE AS %
1	2.1250	5.5068	30.3245	1.174
2	2.2708	6.1670	38.0315	1.472
3	0.7917	1.9236	3.7004	0.143
4	1.5000	5.1654	26.6809	1.033
5	0.9375	3.7212	13.8471	0.536
6	2.4167	6.8349	46.7163	1.808
7	1.8958	5.1910	26.9464	1.043
8	1.9792	6.2823	39.4676	1.528
9	1.7708	4.9561	24.5634	0.951
10	1.0000	2.3247	5.4043	0.209
11	0.6042	2.3223	5.3932	0.209
12	1.0000	2.6256	6.8936	0.267
13	2.1250	6.3635	40.4947	1.568
14	2.5833	8.2998	68.8865	2.667
15	2.5208	9.0082	81.1485	3.141
16	2.2500	6.3731	40.6170	1.572
17	1.7500	4.5171	20.4043	0.790
18	2.6250	9.9672	99.3457	3.846
19	1.1458	5.2834	27.9145	1.081
20	2.1458	8.3002	68.8932	2.667
21	1.3125	4.4251	19.5811	0.758
22	2.2292	7.7549	60.1379	2.328
23	0.8542	2.5264	6.3825	0.247
24	1.8542	5.3355	28.4676	1.102
25	1.1458	3.0804	9.4889	0.367
26	1.0208	3.1923	10.1910	0.395
27	2.1250	7.8595	61.7713	2.391
28	1.0417	4.7890	22.9344	0.888
29	1.3750	5.2374	27.4308	1.062
30	2.1042	7.8177	61.1166	2.366
31	2.3750	9.2129	84.8777	3.286
32	3.1667	12.5822	158.3120	6.128
33	1.3542	5.2572	27.6379	1.070

34	2.3542	11.6354	135.3825	5.241
35	2.4583	6.8664	47.1472	1.825
36	1.7708	5.7584	33.1591	1.284
37	1.9167	5.4493	29.6950	1.150
38	1.6667	8.7503	76.5674	2.964
39	0.7292	3.6829	13.5634	0.525
40	1.0417	6.4904	42.1259	1.631
41	1.2708	7.3274	53.6910	2.078
42	3.5417	13.6522	186.3812	7.215
43	3.6042	13.6503	186.3293	7.213
44	1.7708	6.6820	44.6485	1.728
45	1.8542	7.4233	55.1059	2.133
46	0.7500	3.1114	9.6809	0.375
47	1.2083	5.2793	27.8706	1.079
48	0.8542	3.8647	14.9357	0.578
49	0.2292	0.8313	0.6910	0.027
50	2.0000	11.6089	134.7660	5.217
51	1.7292	6.2730	39.3506	1.523
52	1.5000	6.3346	40.1277	1.553
53	1.6875	6.8047	46.3045	1.792
54	1.2292	4.3085	18.5634	0.719
55	0.4375	1.0700	1.1449	0.044
56	1.2083	7.2139	52.0408	2.015

EIGENANALYSIS UNDERWAY
THRESHOLD = 0.000000491525554
CURRENT V.= 0.000000049979743
NUMBER OF POSITIVE EIGENVALUES = 50
SUM OF POSITIVE EIGENVALUES = 0.56000011E+02
EIGENVALUES

0.2658E+02	0.7926E+01	0.4415E+01	0.2997E+01	0.1891E+01
0.1662E+01	0.1445E+01	0.1315E+01	0.1175E+01	0.1054E+01
0.9571E+00	0.9197E+00	0.8658E+00	0.6215E+00	0.3965E+00
0.3572E+00	0.3011E+00	0.2723E+00	0.1700E+00	0.1314E+00
0.1098E+00	0.1069E+00	0.7607E-01	0.6233E-01	0.5117E-01
0.3769E-01	0.3093E-01	0.2510E-01	0.1326E-01	0.1062E-01
0.1005E-01	0.5029E-02	0.2246E-02	0.1910E-02	0.1670E-02
0.8387E-03	0.7501E-03	0.5985E-03	0.2827E-03	0.1318E-03
0.1180E-03	0.8138E-04	0.3874E-05	0.2364E-06	0.1302E-06
0.1131E-06	0.8685E-07	0.8312E-07	0.6026E-07	0.1224E-07

EIGENVALUES AS PERCENT

47.46	14.15	7.88	5.35	3.38
2.97	2.58	2.35	2.10	1.88
1.71	1.64	1.55	1.11	0.71
0.64	0.54	0.49	0.30	0.23
0.20	0.19	0.14	0.11	0.09
0.07	0.06	0.04	0.02	0.02
0.02	0.01	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00
0.00	0.00	0.00	0.00	0.00

CUMULATIVE PERCENTAGE OF EIGENVALUES

47.46	61.62	69.50	74.85	78.23
81.20	83.78	86.13	88.22	90.11
91.82	93.46	95.00	96.11	96.82
97.46	98.00	98.48	98.79	99.02
99.22	99.41	99.54	99.66	99.75

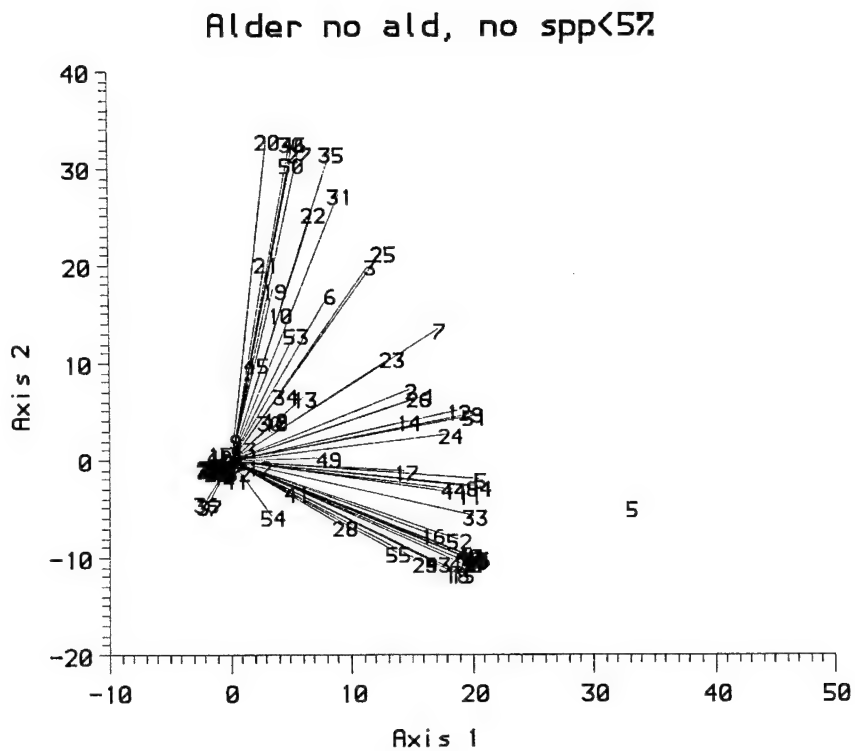
99.81	99.87	99.92	99.94	99.96
99.98	99.98	99.99	99.99	99.99
100.00	100.00	100.00	100.00	100.00
100.00	100.00	100.00	100.00	100.00
100.00	100.00	100.00	100.00	100.00

SQUARE ROOTS OF EIGENVALUES

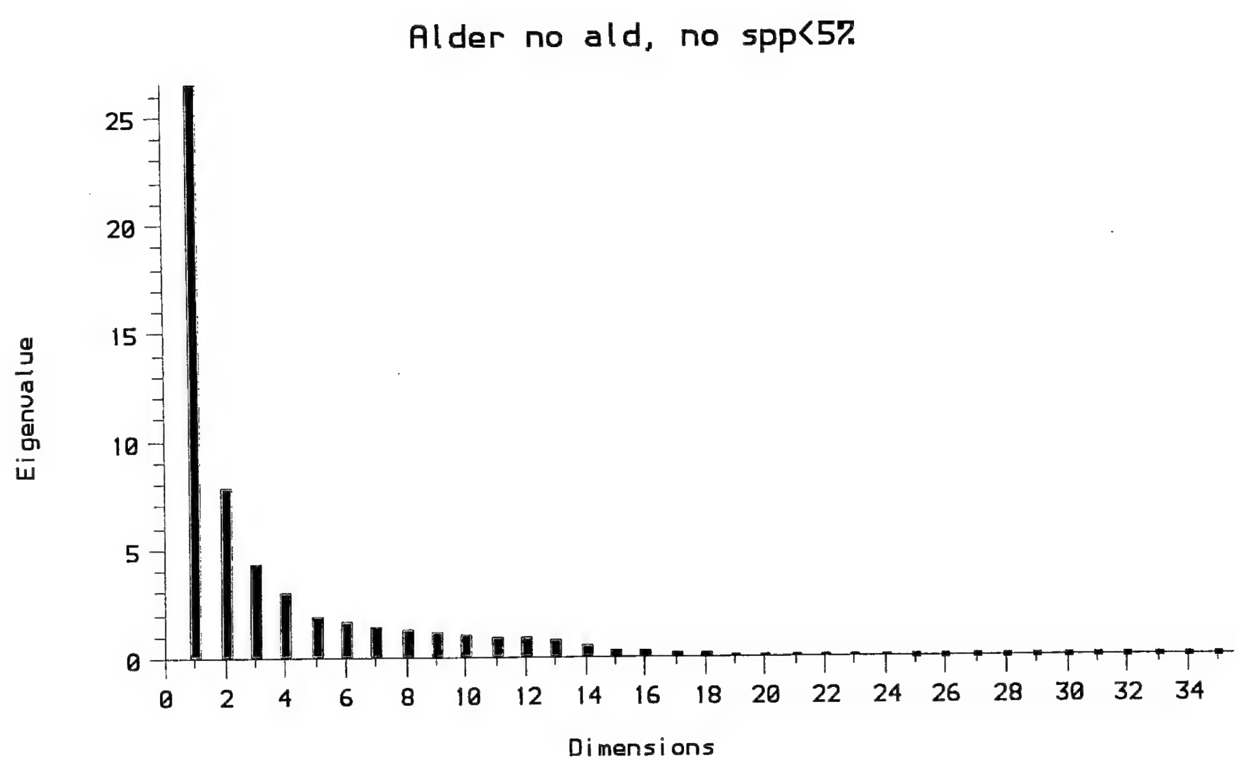
5.155601	2.815235	2.101205	1.731296	1.375208
1.289014	1.202273	1.146529	1.083888	1.026730
0.978320	0.958994	0.930464	0.788361	0.629680
0.597650	0.548681	0.521792	0.412351	0.362429
0.331375	0.326998	0.275799	0.249668	0.226213
0.194129	0.175882	0.158433	0.115140	0.103045
0.100234	0.070913	0.047390	0.043708	0.040861
0.028961	0.027389	0.024464	0.016813	0.011481
0.010861	0.009021	0.001968	0.000486	0.000361
0.000336	0.000295	0.000288	0.000245	0.000111

WARNING:
In the graphics window the variable scores will be rescaled

IVE2. Biplot. Axs1v2 - no alder, no<5.



IVE3. Bar graph - no alder, no spp<5%



IVE4. Non-heirarchical output - no alder, no spp<5%.

SYN-TAX –IVE4

K-MEANS CLUSTERING
Alder, no ald, no spp<5% (last run)

```
INPUT AND RUN PARAMETERS
NUMBER OF VARIABLES    =  48
NUMBER OF OBJECTS      =  56
NUMBER OF CLUSTERS     =   2
INITIAL PARTITION      =RANDOM
FORMAT OF INPUT PARTITION=
NUMBER OF RUNS (SEARCHES)=   5
LABELS FOR OBJECTS     =NOT USED
  RUN  1
  INITIAL PARTITION GENERATED AT RANDOM
  INITIAL PARTITION
  CLUSTER 1
        1  3  5  6  9 11 12 14 15 17
       18 19 20 21 24 25 26 27 28 29
       30 31 35 36 38 39 41 46 48 49
       50 51 52 54 55 56
  CLUSTER 2
        2  4  7  8 10 13 16 22 23 32
       33 34 37 40 42 43 44 45 47 53
 STEP  OBJECT FROM CLUSTER TO CLUSTER     SSQ
  0                          0.78653E+05
  1   18      1      2   0.77329E+05
  2   15      1      2   0.75915E+05
  3   38      1      2   0.74504E+05
  4   22      2      1   0.73124E+05
  5   45      2      1   0.71886E+05
  6   56      1      2   0.70592E+05
  7   53      2      1   0.69230E+05
  8   10      2      1   0.67793E+05
  9   37      2      1   0.66181E+05
 10   13      2      1   0.64702E+05
 11   23      2      1   0.63087E+05
 12    7      2      1   0.62188E+05
 13    2      2      1   0.61148E+05
 14   52      1      2   0.60534E+05
 15   51      1      2   0.60186E+05
 16   29      1      2   0.60109E+05
GROUP MEMBERSHIP VECTOR FOR FINAL PARTITION
 1 1 1 2 1  1 1 2 1 1  1 1 1 1 2  2 1 2 1 1
 1 1 1 1 1  1 1 1 2 1  1 2 2 2 1  1 1 2 1 2
 1 2 2 2 1  1 2 1 1 1  2 2 1 1 1  2
  FINAL CLUSTERS:
  CLUSTER 1
        1  2  3  5  6  7  9 10 11 12
       13 14 17 19 20 21 22 23 24 25
       26 27 28 30 31 35 36 37 39 41
       45 46 48 49 50 53 54 55
  CLUSTER 2
        4  8 15 16 18 29 32 33 34 38
```

```
        40 42 43 44 47 51 52 56
  RUN   2
  INITIAL PARTITION GENERATED AT RANDOM
  INITIAL PARTITION
  CLUSTER  1
         1  4  7  9 10 12 14 15 17 18
        19 20 21 23 28 29 32 33 34 36
        39 40 41 44 45 46 47 52 53 54
  CLUSTER  2
         2  3  5  6  8 11 13 16 22 24
        25 26 27 30 31 35 37 38 42 43
        48 49 50 51 55 56
STEP  OBJECT FROM CLUSTER TO CLUSTER       SSQ
  0                        0.81359E+05
  1   20      1      2    0.80187E+05
  2   42      2      1    0.79191E+05
  3   43      2      1    0.77653E+05
  4   38      2      1    0.76380E+05
  5   56      2      1    0.75222E+05
  6   46      1      2    0.74143E+05
  7   21      1      2    0.73187E+05
  8   19      1      2    0.72225E+05
  9   45      1      2    0.71134E+05
 10   16      2      1    0.70197E+05
 11    8      2      1    0.69209E+05
 12   53      1      2    0.68308E+05
 13   10      1      2    0.67386E+05
 14   36      1      2    0.66339E+05
 15   23      1      2    0.65511E+05
 16   54      1      2    0.64698E+05
 17   51      2      1    0.63966E+05
 18   41      1      2    0.63270E+05
 19   12      1      2    0.62546E+05
 20   28      1      2    0.61904E+05
 21   17      1      2    0.61471E+05
 22    7      1      2    0.61010E+05
 23    1      1      2    0.60611E+05
 24   39      1      2    0.60418E+05
 25    9      1      2    0.60222E+05
 26   14      1      2    0.60109E+05
GROUP MEMBERSHIP VECTOR FOR FINAL PARTITION
 2 2 2 1 2  2 2 1 2 2  2 2 2 2 1  1 2 1 2 2
 2 2 2 2 2  2 2 2 1 2  2 1 1 1 2  2 2 1 2 1
 2 1 1 1 2  2 1 2 2 2  1 1 2 2 2  1
  FINAL CLUSTERS:
  CLUSTER  1
         4  8 15 16 18 29 32 33 34 38
        40 42 43 44 47 51 52 56
  CLUSTER  2
         1  2  3  5  6  7  9 10 11 12
        13 14 17 19 20 21 22 23 24 25
        26 27 28 30 31 35 36 37 39 41
        45 46 48 49 50 53 54 55
  RUN   3
  INITIAL PARTITION GENERATED AT RANDOM
  INITIAL PARTITION
```

CLUSTER 1
1 3 6 8 9 13 14 17 19 20
22 23 25 30 31 32 33 34 36 38
41 42 43 45 46 48 50 52 54
CLUSTER 2
2 4 5 7 10 11 12 15 16 18
21 24 26 27 28 29 35 37 39 40
44 47 49 51 53 55 56

STEP	OBJECT	FROM CLUSTER	TO CLUSTER	SSQ
0				0.81823E+05
1	27	2	1	0.81181E+05
2	35	2	1	0.80592E+05
3	42	1	2	0.79968E+05
4	32	1	2	0.78762E+05
5	43	1	2	0.77079E+05
6	34	1	2	0.75047E+05
7	38	1	2	0.73392E+05
8	53	2	1	0.72240E+05
9	21	2	1	0.71110E+05
10	52	1	2	0.70019E+05
11	8	1	2	0.69048E+05
12	33	1	2	0.68193E+05
13	10	2	1	0.67369E+05
14	37	2	1	0.66508E+05
15	49	2	1	0.65522E+05
16	55	2	1	0.64602E+05
17	26	2	1	0.63932E+05
18	12	2	1	0.63280E+05
19	11	2	1	0.62666E+05
20	28	2	1	0.62007E+05
21	2	2	1	0.61473E+05
22	7	2	1	0.60917E+05
23	5	2	1	0.60631E+05
24	39	2	1	0.60402E+05
25	24	2	1	0.60109E+05

GROUP MEMBERSHIP VECTOR FOR FINAL PARTITION
1 1 1 2 1 1 1 2 1 1 1 1 1 1 2 2 1 2 1 1
1 1 1 1 1 1 1 1 2 1 1 2 2 2 1 1 1 2 1 2
1 2 2 2 1 1 2 1 1 1 2 2 1 1 1 2
FINAL CLUSTERS:
CLUSTER 1
1 2 3 5 6 7 9 10 11 12
13 14 17 19 20 21 22 23 24 25
26 27 28 30 31 35 36 37 39 41
45 46 48 49 50 53 54 55
CLUSTER 2
4 8 15 16 18 29 32 33 34 38
40 42 43 44 47 51 52 56
RUN 4
INITIAL PARTITION GENERATED AT RANDOM
INITIAL PARTITION
CLUSTER 1
10 11 12 13 19 20 25 27 28 30
32 33 36 38 42 45 46 50 54 55
56
CLUSTER 2

1 2 3 4 5 6 7 8 9 14
15 16 17 18 21 22 23 24 26 29
31 34 35 37 39 40 41 43 44 47
48 49 51 52 53

STEP	OBJECT	FROM CLUSTER	TO CLUSTER	SSQ
0				0.80406E+05
1	42	1	2	0.78855E+05
2	32	1	2	0.76625E+05
3	38	1	2	0.74894E+05
4	56	1	2	0.73352E+05
5	31	2	1	0.72158E+05
6	35	2	1	0.70863E+05
7	22	2	1	0.69634E+05
8	21	2	1	0.68528E+05
9	33	1	2	0.67445E+05
10	37	2	1	0.66711E+05
11	49	2	1	0.65897E+05
12	3	2	1	0.65029E+05
13	53	2	1	0.64301E+05
14	6	2	1	0.63471E+05
15	23	2	1	0.62673E+05
16	26	2	1	0.62124E+05
17	41	2	1	0.61499E+05
18	7	2	1	0.61313E+05
19	17	2	1	0.61132E+05
20	2	2	1	0.61039E+05
21	1	2	1	0.60820E+05
22	5	2	1	0.60703E+05
23	48	2	1	0.60653E+05
24	39	2	1	0.60522E+05
25	9	2	1	0.60405E+05
26	24	2	1	0.60222E+05
27	14	2	1	0.60109E+05

GROUP MEMBERSHIP VECTOR FOR FINAL PARTITION
1 1 1 2 1 1 1 2 1 1 1 1 1 1 2 2 1 2 1 1
1 1 1 1 1 1 1 1 2 1 1 2 2 2 1 1 1 2 1 2
1 2 2 2 1 1 2 1 1 1 2 2 1 1 1 2

FINAL CLUSTERS:

CLUSTER 1
1 2 3 5 6 7 9 10 11 12
13 14 17 19 20 21 22 23 24 25
26 27 28 30 31 35 36 37 39 41
45 46 48 49 50 53 54 55

CLUSTER 2
4 8 15 16 18 29 32 33 34 38
40 42 43 44 47 51 52 56

RUN 5

INITIAL PARTITION GENERATED AT RANDOM

INITIAL PARTITION

CLUSTER 1
1 5 6 7 8 9 10 11 13 14
15 16 17 18 21 24 25 28 30 31
32 34 35 37 41 42 43 50 51 54
55 56

CLUSTER 2
2 3 4 12 19 20 22 23 26 27

29 33 36 38 39 40 44 45 46 47
48 49 52 53

STEP	OBJECT	FROM CLUSTER	TO CLUSTER	SSQ
0				0.81081E+05
1	38	2	1	0.80289E+05
2	50	1	2	0.79543E+05
3	30	1	2	0.78362E+05
4	31	1	2	0.77222E+05
5	35	1	2	0.76182E+05
6	21	1	2	0.75262E+05
7	40	2	1	0.74301E+05
8	52	2	1	0.73430E+05
9	44	2	1	0.72595E+05
10	47	2	1	0.71733E+05
11	33	2	1	0.70861E+05
12	4	2	1	0.70036E+05
13	29	2	1	0.69201E+05
14	6	1	2	0.68494E+05
15	25	1	2	0.67761E+05
16	37	1	2	0.66999E+05
17	10	1	2	0.66134E+05
18	55	1	2	0.65350E+05
19	13	1	2	0.64540E+05
20	54	1	2	0.63748E+05
21	41	1	2	0.63032E+05
22	11	1	2	0.62461E+05
23	28	1	2	0.61857E+05
24	17	1	2	0.61487E+05
25	7	1	2	0.61112E+05
26	1	1	2	0.60796E+05
27	5	1	2	0.60522E+05
28	9	1	2	0.60405E+05
29	24	1	2	0.60222E+05
30	14	1	2	0.60109E+05

GROUP MEMBERSHIP VECTOR FOR FINAL PARTITION

2 2 2 1 2 2 2 1 2 2 2 2 2 2 1 1 2 1 2 2
2 2 2 2 2 2 2 2 1 2 2 1 1 1 2 2 2 1 2 1
2 1 1 1 2 2 1 2 2 2 1 1 2 2 2 1

FINAL CLUSTERS:

CLUSTER 1

4 8 15 16 18 29 32 33 34 38
40 42 43 44 47 51 52 56

CLUSTER 2

1 2 3 5 6 7 9 10 11 12
13 14 17 19 20 21 22 23 24 25
26 27 28 30 31 35 36 37 39 41
45 46 48 49 50 53 54 55

LIST OF PERSONNEL RECEIVING COMPENSATION FROM THE RESEARCH EFFORT

Gerald (Jerry) Tande	(JT, TA)	Principal Investigator/Vegetation Ecologist
Susan Klein	(SK)	Field Assistant/Plant Ecologist
Julie Michaelson	(JM)	Field Botanist/Ecologist/Data Manager/GIS Specialist

Abbreviations are provided for future reference to notations in the field data.